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ABSTRACT

A study was conducted primarily to determine the impact of low-cost, replicable procedures for increasing exploration of and preference for careers in science and technology on the part of high school females with potential for such careers. Three-hundred and ninty ninth-grade females with above average academic ability were randomly assigned to an intervention group and a control group. Interventions included a non-sex-restrictive interest inventory supplemented with group discussions of career planning in general and science/technology careers in particular. In addition, a sample of 1,017 twelfth-graders was selected who were not planning majors in science or technology but who had high ability test scores and grades in science and math. These students were also randomly assigned to an intervention and a control group. Both groups received the usual ACT (American College Testing) Assessment score reports and interpretive booklets. However, the intervention group received two later mailings. The first mailing contained a letter calling attention to the recipients' high potential for careers in science and technology, a list of examples of science/technology programs at colleges of each student's choice, and a copy of a booklet entitled "Women in Science and Technology: Careers for Today and Tomorrow." The second mailing contained a list of resource books/materials on career planning and an invitation to return a postcard requesting additional information on specific occupations. Statistical analyses of the outcome data for both groups indicated that the interventions were not effective in accomplishing project objectives. (EM)

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FINAL REPORT

PROMOTING THE EXPLORATION OF PERSONALLY RELEVANT CAREER OPTIONS IN SCIENCE AND TECHNOLOGY

National Science Foundation
Grant No. SMI75-18149 A01

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October 1976

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Dale J. Prediger
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Summary of Final Report

PROMOTING THE EXPLORATION OF PERSONALLY RELEVANT CAREER OPTIONS IN SCIENCE AND TECHNOLOGY

The formation of career preferences, though only one of a long chain of events in a career, is nonetheless an important aspect of career development. Preferences lead to occupational exploration, plans, preparation, and entry. Especially in fields such as science and technology, which are not easily entered in a casual manner, a high school student's career preferences can have a significant impact on subsequent career decisions. It is well known that relatively few high school girls state a preference for careers in science and technology.

The general goal of this project was to determine the impact of low-cost, replicable procedures for increasing exploration of and preference for careers in science and technology on the part of large numbers of high school girls with potential for such careers. The project also examined barriers, facilitating factors, and information needs related to the consideration of science and technology careers on the part of these girls. Two samples of high school girls were involved: 9th graders and college-bound 12th graders. Project interventions differed substantially for these two samples and, in effect, separate studies were conducted.

9th Grade Study

The primary objective of the 9th grade phase of the project was to evaluate the effectiveness of a vocational interest inventory and associated interventions in stimulating exploration of, preference for, and planning toward science/technology careers by girls possessing personal characteristics (abilities and interests) compatible with such careers. A subsidiary objective was to evaluate the effectiveness of the interventions in stimulating career exploration on the part of able 9th grade girls in general.

The study was conducted during the 1975-76 academic year in three high schools--an urban school, a suburban school, and a rural-consolidated school. In each school, 9th grade girls with above average academic ability were randomly assigned to an intervention group and a control group. There were 390 girls in the study, 195 in each group.

The intervention procedures were designed to encourage the 9th grade girls to explore the full range of occupational options and to make career plans that are unrestricted by sex stereotyped attitudes and beliefs. By making girls aware of the full range of occupations appropriate to their career-related activity preferences, the 9th grade study sought to increase the number of girls who would explore and consider careers in science and technology. Interventions included a non-sex-restrictive interest inventory supplemented with group discussions of career planning in general and science/technology careers in particular. These interventions are relatively inexpensive to implement in comparison to other types of interventions (e.g., one-to-one counseling, special workshops) and can be delivered to large groups of students in a relatively short time.

Although there were a few trends favoring the intervention group, statistical analyses of outcome data related to the primary objective did not indicate that the interventions were effective. Hence, implementation of project interventions

related to this objective cannot be recommended. With respect to the subsidiary objective, analyses of outcome data indicate that a brief report of vocational interest results can stimulate career exploration on the part of 9th grade girls and increase congruence between measured interests and occupational preferences. Although the statistically significant differences between intervention and control groups were not large, they were similar in magnitude to differences reported in other studies of the effects of interest inventories. This finding is particularly encouraging because, contrary to the previous studies, the study used a non-sex-restrictive interest inventory. Thus, the stereotypic occupational preferences held by many of the girls in the study were not reinforced by the interest reports. Instead, these girls frequently received interest scores incongruent with traditional sex-role expectations. Nevertheless, over 90% of intervention group members thought that other students should have the opportunity to complete the interest inventory.

12th Grade Study

The primary objective of the 12th grade phase of the project was to determine whether a low-cost, direct mailing of personally relevant materials about careers in science and technology would stimulate exploration of, preference for, and planning toward science/technology careers on the part of college-bound women possessing personal characteristics (abilities and interests) compatible with such careers. Although the primary objective focuses on able girls who also have inventoried interests compatible with careers in science/technology, it is possible that level of interest has little relationship to the effectiveness of the interventions. Hence, a subsidiary objective of the primary objective was to determine whether any of the intervention and control group differences observed for girls with high measured interests in science/technology were also present for girls with low measured interests in science/technology. The expectation was that no treatment effects would be observed for the low interest groups.

The study involved a carefully selected subsample of the 500,000 college-bound women who completed the ACT Assessment Program in 1975-76. Several screening variables were applied to produce a pool of 1,017 12th graders not planning majors in science or technology but who had high ability test scores and grades in science and math. Two subgroups of this pool were identified: students with high measured interests in science and technology and students with low measured interests in these areas. Within each subgroup, students were randomly assigned to intervention and control groups. There were approximately 255 students in each of the four groups.

Both intervention and control groups received the usual ACT Assessment score report and interpretative booklet according to the regular schedule. No other communication with the control groups occurred until the project outcome measures were administered in the spring of 1976. Beginning in January 1976, intervention group members received two mailings. The first mailing contained a letter calling attention to the recipients' high potential for careers in science and technology, a list of examples of science and technology programs at colleges of each student's choice, and a copy of a booklet entitled Women in Science and Technology: Careers for Today and Tomorrow. The booklet, developed specifically for the project by ACT, attempts to provide women with new perspectives on careers in science and technology. For example, pictures of women performing various tasks in scientific and technical occupations are presented as role models, myths concerning women's careers are discussed in light of realities, and steps in career planning are outlined. The booklet specifically encourages college-bound girls to consider careers in science and technology.

The second mailing to intervention group members contained a reminder about the first mailing, a list of resource books and materials on career planning, and an invitation to return a postcard requesting additional information on specific occupations. Late in the spring of 1976, identical outcome measures were administered by mail to each treatment group. The overall response rate was 94%.

Statistical analyses of the outcome data indicated that the interventions were not effective in accomplishing project objectives. Hence, implementation of the project interventions is not recommended. Whether more intensive intervention procedures would be effective remains to be seen. Because such procedures are likely to be costly (in terms of the number of persons they reach) and difficult to implement on a broad scale, they should be thoroughly tested before large amounts of federal money are invested in their implementation.

Student Perception of Barriers, Facilitating Factors, and Information Needs

Student perceptions of barriers, facilitating factors, and information needs related to the consideration of careers in science and technology were separately investigated in the 9th and 12th grade studies by means of questionnaires developed specifically for the project. Responses from intervention and control groups were combined because only minor differences were observed. Results for the two studies suggest that relatively few girls choose careers in science and technology because: They have doubts about combining family life with a science career; they lack information about steps in preparing for a science career; they believe preparation to be long and difficult; they receive little encouragement from influential adults; and they see few examples of the important role women can play in science. The data describing the students' perceptions of facilitating factors and information needs suggest that encouragement from family, access to role models, extra help and encouragement from science teachers, and information about careers in science, including the steps involved in preparation, might be influential in helping change perceptions of barriers to careers in science and technology.

PROMOTING THE EXPLORATION OF PERSONALLY RELEVANT CAREER OPTIONS IN SCIENCE AND TECHNOLOGY

The major purpose of this project was to examine the impact of low-cost programs for increasing exploration of and preferences for careers in science and technology on the part of large numbers of high school girls with potential for such careers. The project also examined barriers, facilitating factors, and information needs related to the consideration of science and technology careers by these girls. Two samples of high school girls were involved: 9th graders and college-bound 12th graders. Project interventions differed substantially for these two samples and, in effect, separate studies were conducted. For this reason, the 9th grade and 12th grade phases of the project are described in separate sections of this report. Following these sections, the barriers, facilitating factors, and information needs perceived by members of both samples are summarized.

Rationale for the Project

The Problem

Sex typing of interests and occupational preferences occurs among children as early as elementary school (Harris, 1974; Schlossberg & Goodman, 1972) and continues into adult life (Shinar, 1975). Two recent, large-scale studies indicate that sex differences in occupational preferences, interests, and work-related experiences are well established by the time students enter high school (Prediger, Roth, & Noeth, 1973; Measurement and Research Center, 1972). The former study found that over half of the 8th and 11th grade girls in the nation prefer occupations falling in only 3 of 25 job families (i.e., clerical and secretarial work, educational and social services, nursing and human care). In contrast, less than 10% of the national sample of boys prefer occupations in these areas. This pattern of sex-typed choices is also found in the occupational preferences of the 900,000 college-bound students who take the ACT Assessment (ACT, 1976) each year.

The need to encourage women to consider careers in science and technology is also indicated by the concentration of women workers in a limited number of typically low paying occupations (Bureau of Census, 1975). In 1973, women made up 99% of the secretaries, 96% of the nurses, 83% of the librarians, and 70% of the school teachers, but only 22% of the accountants, 4% of the lawyers, and less than 1% of the engineers. Although the trend might be expected to be different among younger people, in 1971 women were still being awarded only 12% of the degrees in architecture and environmental design, 9% of the degrees in business and management, 14% of the degrees in the physical sciences, 5% of the degrees in law, and 1% of the degrees in engineering. Percentages of doctoral degrees granted to women in the sciences were higher in the 1920's than in any decade since. The proportion of women in science is small and it drops as level of degree, salary, academic rank, and administrative responsibility increases (Vetter & Babco, 1975).

Proponents of women's movement and members of the science community have begun to recognize that women are a major untapped national resource. Today, there is a growing body of speculation, theory, and research related to such questions as why women have not pursued careers in science and technology, how sex typing of occupational preferences occurs, and what can be done about it.

The Importance of Occupational Preferences

The formation of occupational preferences, though only one of a long chain of events in a career, is nonetheless an important aspect of career development. Early preferences related to science and technology can play a significant role in career planning because the bases for achievement in these fields is more sequential than in most others (Casserly, 1975). Many college programs in science or technology have as a prerequisite completion of a sequence of high school mathematics and science courses. Inadequate preparation in high school mathematics is referred to in a study by Sells (cited by Ernest, 1975) as a "critical filter" limiting the percentage of women in many fields in

addition to mathematics. Sells examined a systematic random sample of freshmen admitted to Berkeley in the fall of 1972 and found that 57% of the boys had taken 4 full years of mathematics, including the trigonometry and solid geometry sequence, but that only 8% of the girls had done so. According to Sells, the 4-year mathematics sequence is required for admission to Mathematics 1A, which in turn is a prerequisite to majors in every field at the university except the fields of humanities, social sciences, librarianship, social welfare, and education. Thus, belated preferences for science and technology careers may be unrealistic without adequate preparation in high school and college. Although the door to scientific fields will not be entirely closed, the failure to take preparatory courses can have considerable impact on a girl's later career options.

Since career preferences are especially salient in the 9th and 12th grades, when educational decisions for the next few years are often made, this project focused on these two grades. Project interventions were designed to introduce girls to careers in science and technology, particularly girls with characteristics compatible with these careers, by presenting those fields as attractive options for women as well as for men.

Influences on Occupational Preferences

Influences on occupational preferences begin at an early age when children begin to form concepts of sex-typed occupations (Kohlberg, 1966, 1969; Maccoby & Jacklin, 1974). According to Kohlberg's theory of cognitive development, children acquire concepts of what it is to be male or female, and once they have a clear understanding of their own sex identity, they attempt to fit their behavior to their concepts of what behaviors are appropriate (Kohlberg, 1966). If the father works outside the home and the mother does not, this fact contributes to a child's concept of what it is to be male or female. In school, if the teachers and secretaries are all female and the principals are all male, this fact contributes to the child's conception of sex role. In the doctors' and dentists' offices, if the doctors are all male and the nurses and assistants

are all female, this fact contributes to the child's conception of sex roles. Employee role models, whether at home, at school, in the community, or in the media, become sex role stereotypes. Sex role stereotypes occur when children begin to assume that, because members of a sex share a common gender, they also share common abilities, interests, values, and/or roles. Occupations become sex typed in this way. Literally hundreds of articles, books, and conferences have documented the pervasiveness of sex role stereotyping in schools and its harmful effects on women's career development.

Sex role standards, the unwritten rules determining which behaviors, skills, and attitudes are sex typed and which are not, imply definitions of masculinity and femininity. As soon as children formulate concepts of masculinity and femininity by identifying various behaviors as appropriate or inappropriate for each sex, they begin to assess themselves according to how they think they conform to the set of attributes they perceive as "masculine" or "feminine." To maintain a self-image as masculine or feminine, individual children learn to suppress any behavior that they consider to be undesirable or inappropriate for their own sex. As a result, the traditional sex role standards have greatly restricted the range of behaviors considered acceptable for each sex, particularly career-related preferences in females (e.g., see Kagen, 1964; Harris, 1974).

The orientation of women and girls toward various careers is thus influenced by sex role socialization, which in turn, affects academic preparation. In particular, emphasis on intellectual mastery of science and mathematics varies with the sex role standards or stereotypes for each sex. According to a National Science Foundation study by Fennema and Sherman (1976), sex role stereotypes are a major reason that fewer girls than boys take math courses after the second year of high school.

Textbooks and materials also reflect a restricted range of occupations for women. A detailed analysis of 2,760 short stories in elementary school readers revealed that men are shown in 147 different occupations, but women in only 25

(Women in Words and Images, 1972). Adult women are depicted in extremely limited roles. They are almost always shown as mothers and then in a narrowly defined version of that role. Mathematics and science materials are particularly deficient in the portrayal of women's roles (Weitzman & Rizzo, 1974; Jay & Schminke, 1975). The materials generally portray a world in which girls and women cook and sew and do little else.

Vetter, Stockburger, & Brose (1974), who conducted a content analysis of more that 9,500 pages and 1,850 illustrations, found sex role stereotyping in almost all of the high school career guidance material available since 1970. Random samples of the materials taken from commercial and noncommercial lists revealed that 75% of single-sex illustrations and 75% of proper names are male. Since differences in achievement appear to be heavily dependent upon students' perceptions of given areas (e.g., mathematics, reading, science) as sex appropriate or sex inappropriate (Dwyer, 1974; Kagan, 1964; Houts & Entwisle, 1968), the subtle messages about careers found in most school materials have implications for the development of career preferences and orientations.

Another institutional source of influence on career exploration and decision making behaviors is the school counselor. Schlossberg and Pietrofesa (1973), for example, reviewed research on counselor bias and found definite support for the concept that counselors ascribe particular sex roles to men and to women and that counselor interview behavior reflects these biases. Such bias is often further reflected in the materials and approaches counselors use in working with students. Thomas and Stewart (1971), for example, found that counselors, regardless of sex, rated female clients with "deviate" (not traditionally feminine) career goals to be more in need of counseling than those with "conforming" (traditionally feminine) goals.

Ahrons (1976) investigated perceptions of female and male vocational and social roles. Her study of Wisconsin school counselors suggested that counselors perceive that for women the career role is isolated from or

incompatible with other female roles. Counselors may reflect these values in counseling and may perpetuate girls' already restricted vocational outlooks, thus discouraging any nontraditional ideas and aspirations which they may tenuously hold.

In a study funded by the National Science Foundation, Casserly (1975) assessed factors which affected the participation of high school girls in math and science advanced placement programs. More than 160 girls at 13 secondary schools were interviewed. Casserly found that many guidance counselors were reported to be poor sources of encouragement for girls interested in mathematics and the physical sciences.

Implications for Possible Interventions

School practices. Speculation about and recommendations for workable interventions to reduce harmful effects of sex role stereotyping have been extensive (e.g., see Institute for Educational Leadership, 1975; McCune & Matthews, 1976). Suggestions have been made to rewrite textbooks and materials; eliminate sex-segregated classes; revise curriculum and instructional procedures; equalize personnel practices; provide inservice training; initiate affirmative action programs; promote women's studies; provide special seminars, courses, and workshops for students; and change everyday practices, expectations, and policies on the part of teachers, counselors, and administrators. Although changes in school practices may have a cumulative impact on reducing sex role stereotypes by promoting nontraditional career exploration activities and expanding career preferences among both sexes, these changes will probably occur slowly. Personally relevant, direct contact procedures that reach large numbers of students may have more immediate promise for widening the career horizons for high school students.

Workshops and institutes. One way to contact students directly is through workshops and institutes. Two recent projects sponsored by the National Science Foundation were designed to assess experimentally the value of special workshops

for capable college-bound high school girls who have previously expressed plans to enter a career in science. In the first study (Smith, Stroup, & Coffman, 1975), experimental and control groups were established and experimental subjects participated in one of five regional workshops. Self-assessment techniques, life planning sessions, and sessions with role models pursuing nontraditional careers were used to encourage participants to consider traditionally male science careers. Comparative data on experimentals and controls are not yet available. In the second study (Newton et al., 1976), a series of six career development workshops and several follow up sessions were designed to incorporate specific strategies for increasing girls' interest in science. According to the study report, the program appeared to be unsuccessful in increasing interest in scientific fields. Girls in the experimental group showed an actual decrease in mean levels of scientific interest as measured by the evaluation instrument.

Although the workshop as an intervention procedure offers an opportunity to test a variety of strategies for expanding career options, it has several drawbacks.

1. The workshop is an expensive way to reach large numbers of students. Only a small percentage of a given age group can be reached even with an extensive, nationwide program.

2. It is unlikely that workshops will be funded and undertaken by many institutions on their own.

3. Workshops typically reach girls already interested in science/technology careers. Thus, they have little impact on girls with potential for such careers but with preferences in other, more traditional career areas.

4. Workshops designed to attract girls to science/technology might appear to some as recruitment for one career area to the detriment of other career areas.

Vocational counseling. Another common way to contact students directly about their career options is through the school counselor. However, in addition

to the previously cited studies indicating that sex stereotyping affects their work with students, questions have been raised about the effectiveness of counselors in the career-advisor role. For example, the recent Nationwide Study of Student Career Development (Prediger, Roth, & Noeth, 1973) showed that student-expressed need for help in career planning is in sharp contrast to the help students feel they receive from their counselors. Preliminary findings of the National Longitudinal Study of the High School Class of 1972 (Guidepost, 1973) indicate the typical counselor has an average case load of about 350 students and spends less than one-fourth of the time working with students on vocational concerns. Because individual counseling is a time-consuming and expensive process, other procedures that will increase the scope and depth of non-sex-stereotyped career exploation need to be identified.

Tests and interest inventories. Tests in general and interest inventories in particular provide a potentially powerful yet inexpensive tool for stimulating career exploration on the part of large numbers of students. However, research on the effects of tests on students has typically focused on variables such as the recall of test scores and accuracy of self-estimates (e.g., see Walker, 1965; Folds & Gazda, 1966; Peckens & Bennett, 1968). In contrast, what students do after obtaining and studying test results, a key factor in the effective use of test information (Prediger, 1974), has received relatively little attention.

Methods for effectively studying the information-seeking behaviors of high school students have been demonstrated in studies involving other types of counseling/guidance experiences (e.g., see Borman, 1972; Krumboltz & Schroeder, 1965; Krumboltz & Thoresen, 1964). Recently, studies which focus specifically on student behaviors resulting from the report of interest inventory scores have begun to appear. Two such studies have involved high school students. Zener and Schnuelle (1976) found that although students in grades 10--12 were, on the average, considering more occupations after receiving an interest

inventory report, information-seeking behaviors did not increase. In a similar study, Redmond (1973) demonstrated increases both in information-seeking behaviors and in the number of occupations considered as a result of interest score reports. However, the two studies used an inventory that refers males and females in large numbers to occupations traditional to their sex (Gottfredson, Holland, & Gottfredson, 1975) and hence is sex restrictive (Prediger & Hanson, 1974). Nevertheless, the study by Redmond suggests that interest inventories may have promise as a tool for helping females consider the full range of occupations, including occupations in science and technology.

The major guidance function performed by interest inventories is to suggest occupations for exploration on the basis of a person's career-related activity preferences. However, most interest inventories in widespread use suffer from serious limitations, such as failure to translate interest scores into their occupational significance, coverage of only a small segment of the work world, and sex restrictiveness. As demonstrated by the ACT Interest Inventory in its various forms (ACT, 1972, 1974c; Hanson, 1974), each of these limitations can be overcome. Sex restrictiveness, for example, is present in those inventories which direct disproportionate numbers of women toward traditional occupations (e.g., teaching, office work, nursing) and away from nontraditional occupations (e.g., occupations in the fields of science/technology). Yet eight recent studies summarized by Prediger and Hanson (1976) indicate that sex restrictiveness is not a necessary concomitant of validity. Accordingly, the ACT Interest Inventory provides similar career suggestions to males and females, and the suggestions span the entire world of work. Approximately equal proportions of both sex groups are referred to occupations in science and technology (Cole & Hanson, 1975; Prediger & Hanson, 1974).

Implications for Procedures Used in Project

Two separate lines of investigation were undertaken in this project, each growing out of the considerations addressed in the previous sections of this

report. The rationale for procedures used in the ninth grade study is presented below followed by the rationale for the twelfth grade study.

Ninth grade study. Little research has been done to assess the effects of intervention procedures on the career exploration, planning, and decision-making behaviors of students during the early years of high school. This is particularly true of the kinds of guidance activites that can be easily implemented and delivered to large numbers of students. The research on this general topic has often involved direct counselor contact with individuals, either alone or in groups. Krumboltz and Thoresen (1964) and Krumboltz and Schroeder (1965), for example, investigated ways to increase career information-seeking behavior among 11th graders. They found that the use of role models and reinforcement counseling techniques produced a statistically significant increase in the amount of information-seeking behaviors and that group and individual counseling were about equally effective. However, group and individual counseling are difficult to deliver to large numbers of students in the typical school setting.

Nevertheless, there seems to be increasing agreement that special types of guidance programs and services must be implemented to counteract the constraints of sex role socialization on girls' career exploration and decision making behaviors (e.g., see Matthews, 1974; Richardson, 1974; Smith & Herr, 1972). The consideration of nontraditional occupations and choices should be a major emphasis in this guidance activity. Tyler and Sundberg (1964) state that a 10-year-old girl who has ruled out many occupations as unsuitable for girls may never really consider them again and thus may never apply to them the conceptualization processes she develops as she matures. Similarly, Kotcher and Gellman (1976) report that early adolescent females choose more masculine occupations than young women in later adolescence and that compared to early adolescence, later adolescence is a period of identity with stereotyped feminine sex role characteristics.

Those females who do continue to pursue school subjects identified as "masculine" (e.g., science and math) throughout high school often lack support from school personnel (Casserly, 1975; Newton, et al., 1976). Interestingly enough, Casserly reports that the support junior high school girls do receive in pursuing science and math comes from older girls in the school who have themselves nurtured these types of nontraditional interests.

The 9th grade intervention procedures used in this project were designed to encourage girls to explore the full range of career options and to make career plans that are unrestricted by sex-stereotyped attitudes and beliefs. The intervention procedures were based on a non-sex-restrictive career interest inventory supplemented with group discussions of career planning in general and science/technology careers in particular. These procedures are relatively inexpensive to implement in comparison to other types of interventions (e.g., individual counseling, special workshops) and can be delivered to large groups of students in a relatively short time. By making girls aware of the full range of occupations appropriate to their career-related activity preferences, the ninth grade study sought to increase the number of girls who would explore and consider careers in science and technology.

Twelfth grade study. Although many college-bound girls possess personal characteristics (i.e., academic ability and interests) compatible with careers in science and technology, most are not considering such careers. They may lack information to counteract prevailing stereotypes about women in science/technology; they may not have been encouraged to take courses in science or mathematics in the past; and they may lack information about college majors, courses of study, or possible careers in science and technology. Indeed, many capable girls may not have considered the extent to which their abilities and interests are consistent with careers in science and technology simply because no one brought it forcefully to their attention.

The 12th grade phase of the project was designed to determine the effectiveness of low-cost procedures for informing large numbers of college-bound girls not planning majors in science/technology that they possess personal characteristics (abilities and interests) compatible with careers in these areas. Through a booklet developed specifically for the project, college-bound girls were provided with new perspectives on careers for women in science and technology. For example, pictures of women performing various tasks in scientific and technical occupations were presented as role models, myths concerning women's careers were discussed in light of realities, and steps in career planning were outlined. The booklet specifically encouraged college-bound girls to consider careers in science and technology. The project also provided college-bound girls with information about majors and programs of study in science and technology at the colleges each girl was considering.

As with the 9th grade study, the intervention procedures used in the 12th grade study do not require the time consuming and expensive processes of individual counseling or workshops. Instead, they make use of mail contacts in conjunction with test and interest inventory results that are already available through the ACT Assessment Program for nearly 500,000 college-bound girls each year.

9TH GRADE STUDY

Objectives

The primary objective of the 9th grade phase of the project was to evaluate the effectiveness of a vocational interest inventory and associated interventions in stimulating exploration of, preference for, and planning toward science/technology careers by girls possessing personal characteristics (abilities and interests) compatible with such careers. Expected outcomes were as follows:

1. More exploration of occupations in science/technology.
2. More girls wishing to obtain additional information on careers in science/technology.
3. More girls preferring occupations in science/technology.
4. Greater certainty of preference on the part of those girls preferring occupations in science/technology.
5. Greater certainty regarding preparation required for preferred occupations in science/technology.

Although the project focuses on careers in science/technology, it is also more broadly concerned with the general effects of interest inventories and associated interventions on career exploration. If interest inventories help encourage girls with appropriate career-related activity preferences to explore careers in science/technology, their use might be justified on this basis alone. However, in actual practice, an inventory must be administered to all girls in order to identify those whose interests are appropriate to science/technology careers. For this reason, a subsidiary objective of the primary objective was to evaluate the effectiveness of the interventions in stimulating career exploration on the part of able girls in general. Expected outcomes were as follows:

1. More involvement in career exploration in general.
2. More congruence between occupational preferences and measured interests.
3. Greater certainty regarding preparation required for preferred occupations.
4. A favorable reaction to the interventions.

The secondary objective of this phase of the project was to identify the perceived barriers, information needs, and facilitating factors related to the consideration of careers in science/technology as identified by girls with potential for such careers. Procedures and results related to this objective are reported in the section entitled "Barriers, Facilitating Factors, and Information Needs . . .."

Procedures

Sample

The study was conducted during the 1975-76 academic year in three high schools in or near St. Louis, Missouri--an urban school, a suburban school, and a rural-consolidated school. These schools were selected to cover a range of community sizes and socio-economic backgrounds. However, there is no assumption that they represent a cross-section of schools in the United States.

The target sample in each of the schools was defined as all 9th grade girls of above average academic ability as indicated by standardized ability or achievement test data already in the schools' files. Students were classified as having above average academic ability if they were at or above the 51st percentile (national norms) on the Otis Lennon IQ test (urban school), the Iowa Test of Educational Development composite score (suburban school), and the Stanford Achievement Test composite score (rural-consolidated school). Academic ability was considered to be an important characteristic for girls in this study as it is correlated with success in educational programs in science/technology. Persons in the fields of science and technology are usually of above average academic ability, often considerably above average. The cut-off used to identify 9th graders with potential for careers in science and technology takes into account the fact that standardized tests do not provide precise measures of ability, that educational abilities develop over a period of years, and that the 9th graders in the study have several years of education ahead of them.

Of the 1,172 9th grade girls in the three schools, 530 (43%) were classified as having above average academic ability. Approximately 90% of this group (N = 477) completed the interest inventory and related questions about their career aspirations at the beginning of the study. Intervention, control, and holdout groups were then selected from this sample. Prior to selection, students were classified according to the following two variables:

1. Primary vocational interest type as indicated by the student's highest score on the Vocational Interest Profile (see description provided later).

2. Educational aspiration as assessed by a student's response to the question, "What is the greatest amount of education you plan to complete during your life?" Aspirations were categorized according to whether students did or did not plan to complete a college program of at least two years in duration.

Educational aspiration and vocational interest were selected as stratification variables in order to insure a broad and equivalent range of career interests and aspirations in the intervention and control groups. Students were stratified by interest type and aspiration level within school and then randomly assigned to the intervention and control groups. A holdout group at the suburban school was necessary because of the large enrollment at that school and because of the need to obtain intervention and control groups of equal as well as workable size within that school. Students in the holdout group were treated in the same manner as control group students. The project analyses did not involve the holdout group, however. Tables 1 and 2 provide an overview of sample allocations.

Interventions

Figure 1 shows the general nature and timing of the project activities including initial data collection, interventions, and assessment of outcomes. Project activities were highly similar across the three schools. Intervention procedures are briefly described below.

Reports of vocational interests. The interest inventory used in this study was the ACT Vocational Interest Profile (VIP), a 90-item instrument which assesses

Table 1

Intervention and Control Group Allocation Across Schools

School	Number of 9th grade girls	Sample size	Allocation of sample to treatment		
			Intervention	Control	Holdout group
Urban	350	80	40	40	
Suburban	575	261	87	87	87
Rural consolidated	247	136	68	68	
Total	1172	477	195	195	87

Note. The sample included all girls of above average ability (N = 530) who completed the Vocational Interest Profile and related questions on career aspirations at the initiation of the study (N = 477).

Table 2

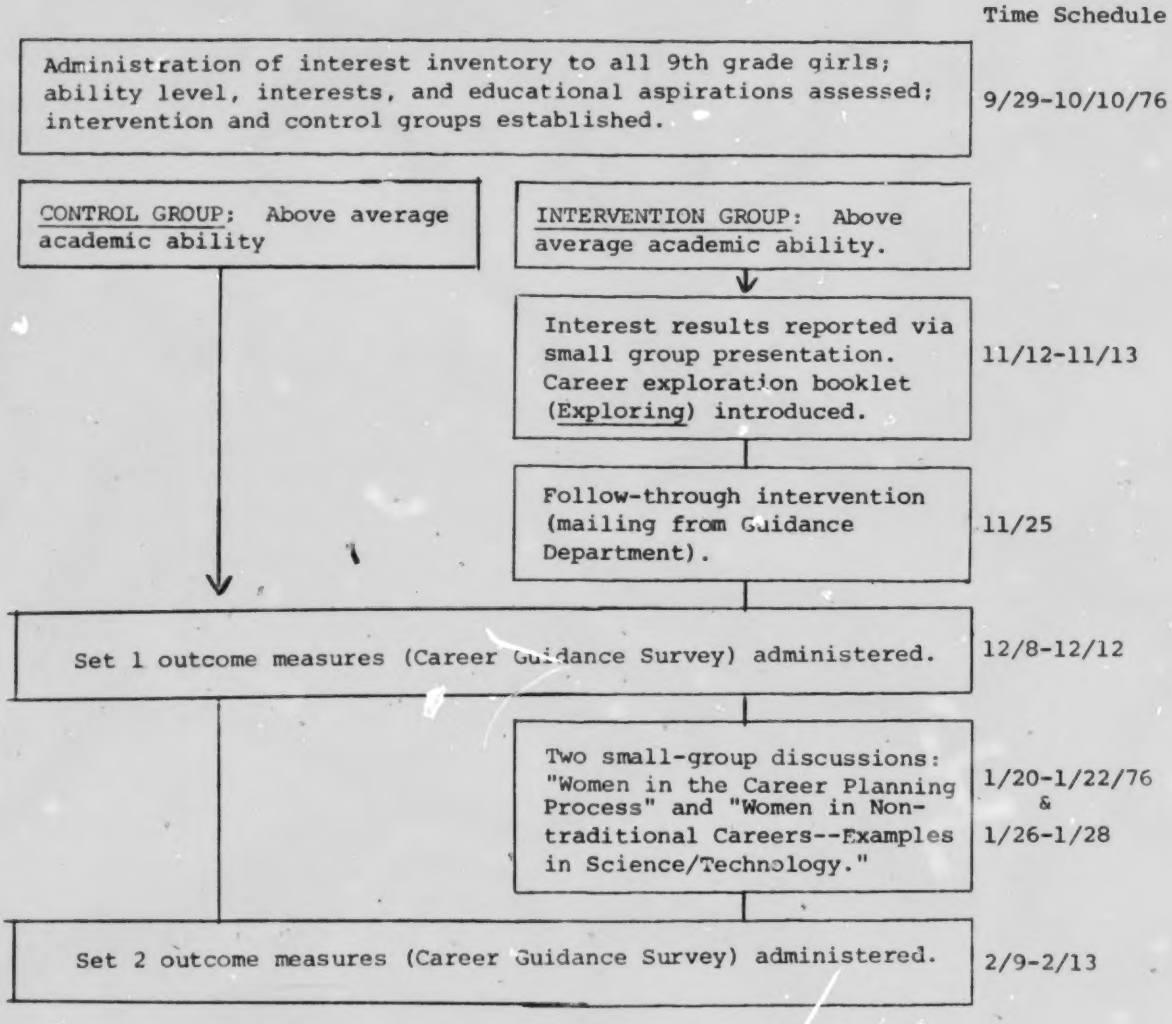
Intervention (I) and Control (C) Group Allocation by School, Educational Aspiration, and Interest Type

Interest type	Urban school				Suburban school				Rural school			
	College[a]		Non-college[a]		College		Non-college		College		Non-college	
	I	C	I	C	I	C	I	C	I	C	I	C
Social service	3	3	1	2	11	10	4	3	7	7	5	6
Business contact	2	1	2	2	8	9	1	2	3	2	2	2
Business detail	4	4	4	4	9	9	5	5	7	8	10	9
Technical	3	3	4	3	13	13	7	6	4	4	6	7
Science	6	6	2	2	11	10	1	2	8	7	3	3
Creative arts	7	7	2	3	12	13	5	5	8	8	5	5
Total	25	24	15	16	64	64	23	23	37	36	31	32

[a]Educational aspiration categories.

Figure 1

Overview of Design


Time Schedule
Administration of interest inventory to all 9th grade girls; ability level, interests, and educational aspirations assessed; intervention and control groups established.
9/29-10/10/76
CONTROL GROUP: Above average academic ability
INTERVENTION GROUP: Above average academic ability.
Interest results reported via small group presentation. Career exploration booklet (Exploring) introduced.
11/12-11/13
Follow-through intervention (mailing from Guidance Department).
11/25
Set 1 outcome measures (Career Guidance Survey) administered.
12/8-12/12
Two small-group discussions: "Women in the Career Planning Process" and "Women in Non-traditional Careers--Examples in Science/Technology."
1/20-1/22/76
&
1/26-1/28
Set 2 outcome measures (Career Guidance Survey) administered.
2/9-2/13

interests in six areas--science, technology, business contact, business detail, social service, and creative arts--corresponding to Holland's (1973) typology. The VIP, one of several forms of the ACT Interest Inventory (Hanson, 1974), was developed for use with junior and senior high school students. Psychometric characteristics are described in detail in the Handbook for the Career Planning Program, Grades 8-11 (ACT, 1974c). As noted earlier, the VIP is not sex restrictive in the career options it suggests.

The first project intervention involved group interpretation of abbreviated VIP results contained on a computer-printed label attached to the front of a 4-page leaflet (see Appendix A). The VIP, as normally used, provides a profile based on scores for the six types of interests listed above. However, the report label, which was specially designed for the project, contained only a single score indicating a student's "World of Work Map" region. The following message was printed on the label. "Based on the activities you like, your World of Work Map region is [student's region]. For job families in this region, see the map on page 19 of 'Exploring'." The map region provides the essential information needed to use the ACT World of Work Map (Prediger, 1976) and minimizes the amount of time needed for VIP group interpretation. In summary, career exploration input from the interest inventory consisted of a single score obtained after the investment of about 15 minutes of a student's time in completing the inventory items.

The VIP report was accompanied by a booklet, Exploring: You and Your Career (ACT, 1974b), which contains the ACT World of Work Map, a brief list of occupations arranged according to the job families shown on the map (the "Job Family List"), charts showing some 650 occupations arranged by job family, and general information on career exploration and planning. The World of Work Map and Job Family List appear as Figures 2 and 3.

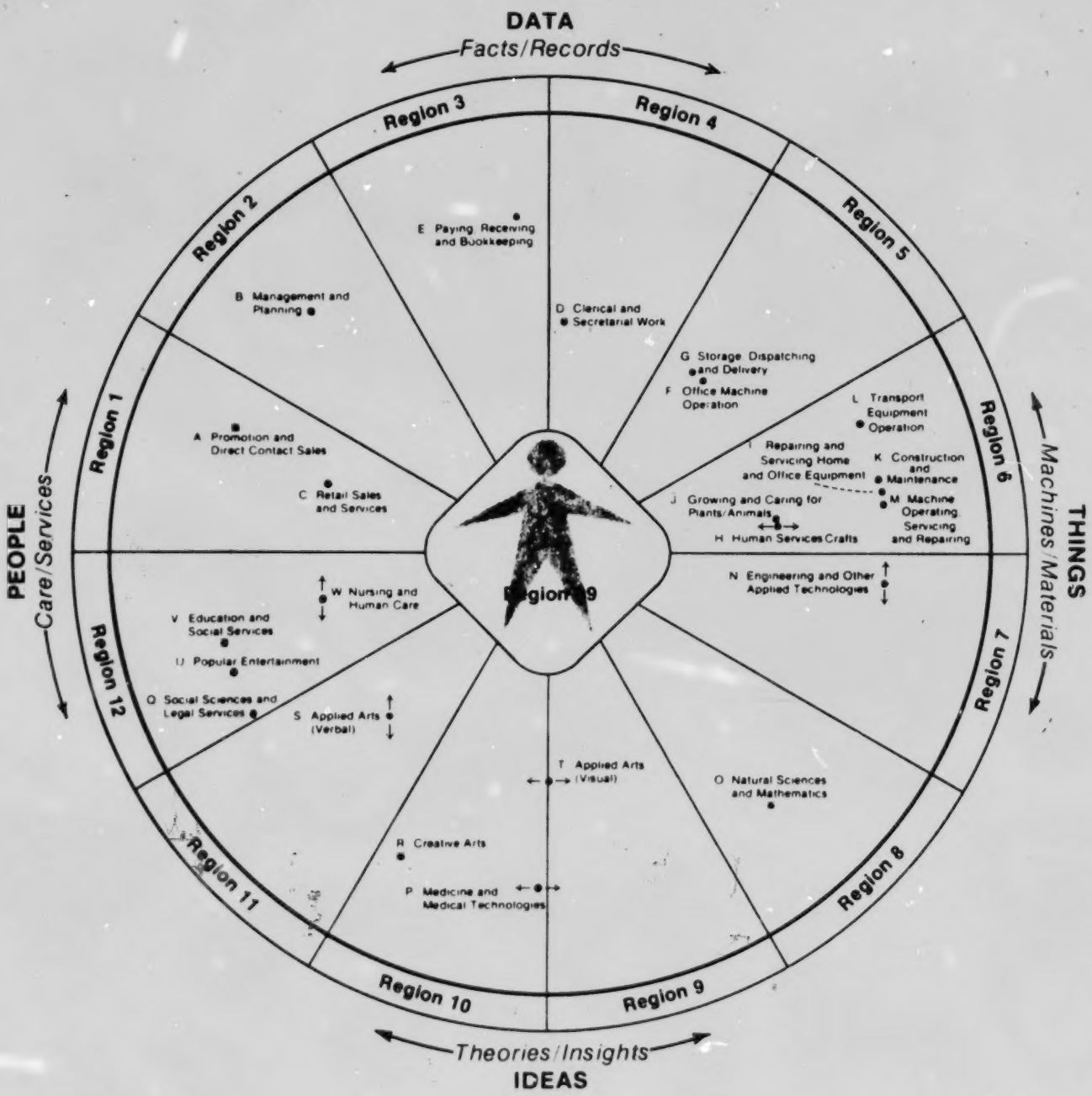
Group sessions (10-20 students per group) for VIP interpretations were jointly conducted by a member of the ACT project staff and a counselor from the

Figure 2

The ACT World of Work Map

This map locates Job Families in the World of Work according to their involvement with DATA, IDEAS, PEOPLE, and THINGS. Arrows by a Job Family show that work tasks often heavily involve both PEOPLE AND THINGS (← →) or DATA AND IDEAS (↕). Although each Job Family is shown as a single point, the jobs in a family vary in their location. Most will scatter near the point that is shown for the Job Family, however.

See your CPP Student Report (bottom, center) for the region of the map in which your interests fall.



Note.—Because not enough information was available, the following two Job Families in the Social, Health, and Personal Services Cluster are not on the map: X *Personal and Household Services*, and Y *Law Enforcement and Protective Services*. Jobs in both of these families tend to fall in the inner area of Regions 2 through 5.

Figure 3

Job Families Arranged by Job Cluster

BUSINESS SALES & MANAGEMENT JOB CLUSTER

A. PROMOTION AND DIRECT CONTACT SALES
Public relations workers, fashion models, travel agents, sales workers who visit customers (for example—real estate brokers, insurance agents, wholesalers, office su, plies sales workers)

B. MANAGEMENT AND PLANNING
Hotel, store, and company managers, bankers, executive secretaries, buyers, purchasing agents, small business owners

C. RETAIL SALES AND SERVICES
Sales workers in stores and shops, auto salespersons, retail sales workers

BUSINESS OPERATIONS JOB CLUSTER

D. CLERICAL AND SECRETARIAL WORK
Typists, file clerks, mail clerks, office messengers, receptionists, secretaries

E. PAYING, RECEIVING, AND BOOKKEEPING
Bank tellers, accountants, payroll clerks, grocery check-out clerks, ticket sellers, cashiers, hotel clerks

F. OFFICE MACHINE OPERATION
Adding, billing, and bookkeeping machine operators, computer and data processing machine operators, telephone operators

G. STORAGE, DISPATCHING, AND DELIVERY
Shipping and receiving clerks, stock clerks, truck and airplane dispatchers, delivery truck drivers, cab drivers, mail carriers

TECHNOLOGIES & TRADES JOB CLUSTER

H. HUMAN SERVICES CRAFTS
Barbers, hairdressers, tailors, shoemakers, cooks, chefs, butchers, bakers

I. REPAIRING AND SERVICING HOME AND OFFICE EQUIPMENT
Repairing and servicing TV sets, appliances, typewriters, telephones, heating systems, photo copiers

J. GROWING AND CARING FOR PLANTS/ANIMALS
Farmers, foresters, ranchers, gardeners, yard workers, groundskeepers, plant nursery workers, animal caretakers, pet shop attendants

K. CONSTRUCTION AND MAINTENANCE
Carpenters, electricians, painters, custodians (janitors), bricklayers, sheet metal workers, construction laborers (buildings, roads, pipelines, etc.)

L. TRANSPORT EQUIPMENT OPERATION
Long haul truck and bus drivers, bulldozer operators, crane operators, forklift operators

M. MACHINE OPERATING, SERVICING, AND REPAIRING
Auto mechanics, machinists, printing press operators, sewing machine operators, service station attendants, laborers and machine operators in factories, mines, lumber camps, etc.

N. ENGINEERING AND OTHER APPLIED TECHNOLOGIES
(For science and medical technicians, see Job Families O and P.)
Engineers and engineering technicians, draftsmen and draftswomen, pilots, surveyors, computer programmers

NATURAL, SOCIAL, & MEDICAL SCIENCES JOB CLUSTER

O. NATURAL SCIENCES AND MATHEMATICS
Biologists, chemists, lab technicians, physicists, geologists, statisticians, agricultural scientists, ecologists

P. MEDICINE AND MEDICAL TECHNOLOGIES
Dentists, doctors, veterinarians, medical technologists and lab workers, pharmacists, X-ray technicians, optometrists, dental hygienists, dietitians

Q. SOCIAL SCIENCES AND LEGAL SERVICES
Sociologists, lawyers, political scientists, psychologists, home economists

CREATIVE & APPLIED ARTS JOB CLUSTER

R. CREATIVE ARTS
Authors, concert singers, musicians, actresses and actors, dancers, artists

S. APPLIED ARTS (VERBAL)
Reporters, technical writers, interpreters, newscasters, newswriters, ad copy writers

T. APPLIED ARTS (VISUAL)
Interior decorators, architects, commercial artists, photographers, fashion designers

U. POPULAR ENTERTAINMENT
Night club entertainers, popular singers and musicians, disc jockeys, circus performers

SOCIAL, HEALTH, & PERSONAL SERVICES JOB CLUSTER

V. EDUCATION AND SOCIAL SERVICES
Teachers*, counselors, social workers, librarians, athletic coaches, recreation workers, clergymen and clergywomen

W. NURSING AND HUMAN CARE
Child care aides, nurses, dental assistants, physical therapists, hospital attendants

X. PERSONAL AND HOUSEHOLD SERVICES
Waiters and waitresses, airline stewardesses and stewards, housekeepers, porters, car hops, butlers and maids

Y. LAW ENFORCEMENT AND PROTECTIVE SERVICES
Police officers, building, food, and postal inspectors, watchmen, plant guards, firefighters

*NOTE: **Teachers:** Students thinking about high school or college teaching should consider whether their main goal is *teaching students* (mark Job Family V) or *doing work or research in the subject area* for example: chemistry, (mark Job Family O), art (mark R or T), economics (mark Q), etc.

school involved. Control group students, upon inquiry, were told that their reports had been delayed. They received their results in similar group sessions shortly after the second set of project outcome measures had been collected.

A 3-page guide was prepared for the group interpretation sessions to insure uniformity across groups and the schools. For the same reason, a project staff member participated in each group session. (Normally, such sessions would be conducted solely by the school staff.) The main objectives of the one-period interpretation sessions were as follows:

1. To help students understand the developmental nature of a career.

2. To teach students about the four basic work tasks (i.e., data, ideas, people, things) used in relating VIP results to the World of Work Map.

3. To help students learn how to use the World of Work Map to identify job families and occupations compatible with their VIP results.

4. To help students become aware of career information resources in their schools.

After use of the VIP reports was explained with the aid of specially prepared transparencies and the Exploring booklet, students received their own reports and identified the job families and occupations they wanted to learn more about. The co-leaders of the session answered questions and provided assistance upon request. After each student had listed career areas for further exploration, the co-leaders drew the group's attention to the school's career materials listed on page 4 of the VIP report (see Appendix A). Students were encouraged to find out more about their career options and to talk with their counselors, teachers, parents, and friends about their career futures.

Approximately 12 days after the group interpretation and a few days before the Thanksgiving recess, a form letter was mailed by the school guidance department to each girl in the intervention group. The letter reminded each girl of her VIP report and encouraged her to become more involved in career exploration activities. A copy of page 4 of the VIP report containing the localized list of career information was enclosed.

Discussion groups. The second major intervention, which occurred about two and one-half months after the VIP interpretations, consisted of two small group (i.e., 10-15 people) discussions spaced about one week apart. Both one-period sessions were co-led by a member of the ACT project staff and a counselor from the students' school. As with the VIP interpretation, a project staff member participated in each session to insure uniformity across groups and schools. A discussion guide was prepared for counselors co-leading the sessions and transparencies were used to stimulate group interaction.

Students were reminded of their VIP reports at the beginning of the first group session but they were not asked to bring the reports with them. The main objectives of the session ("Women in the Career Planning Process") were--

1. To review the developmental nature of a career.
2. To remind students of the many steps involved in career planning
3. To show students the potential career planning resources available at their schools.
4. To develop a readiness for the group session to follow.

The main objectives of the second group session ("Women in Non-Traditional Careers") were--

1. To show how past definitions of men's work and women's work are becoming obsolete.
2. To make students aware of opportunities for women in science/technology areas.
3. To examine some of the feelings a high school girl might have if she were planning a science/technology career.
4. To have students consider the possibility of science/technology careers for themselves.

The second session began with a discussion of the developmental nature of a career and the fact that most women will work at some time during their lives. Discussion focused on nontraditional careers and copies of Women in Science and

Technology: Careers for Today and Tomorrow (see Appendix D) were distributed and reviewed. (This 16-page booklet was prepared by ACT especially for the project. Its development is discussed in the description of the 12th grade phase of the project.) Girls next completed the "Women in Science Exercise," which asked them to project themselves into a science career and to answer questions as if they were personally planning such a career. The ensuing discussion focused on integrating girls' expectations of their reactions and the reactions of others to the attitudes that people have towards careers for women in science/technology. The ways that girls can prepare themselves for such careers were also discussed.

Outcome Measures

The outcome measures used to evaluate the effects of the interventions (see administration schedule in Figure 1) are found in Appendix B. The Set 1 and Set 2 measures (called the "Career Guidance Survey) were identical with the exception that the Set 1 measures requested the reactions of intervention group students to the VIP report.

Although several outcome measures used in similar types of studies were reviewed, most of the items used in this study were taken from the Career Planning Involvement Unit of the ACT Assessment of Career Development (ACD) (ACT, 1974a). This unit uses a self-report inventory to assess amount of career exploration, an outcome directly related to project objectives. Career Guidance Survey questions concerning occupational preference and certainty of preference were also similar to those in the ACD. Finally, new items concerning desire for more information on occupations in each of six career clusters were developed. Prior to finalization, the Career Guidance Survey was field tested with 9th grade girls similar to those in the study in order to assess the clarity of directions and the time required for completion. A major consideration in the development of the Career Guidance Survey was minimizing the amount of time needed for completion.

Class time was typically used during administration of both sets of outcome measures and all 9th grade girls in a school completed the outcome measures at essentially the same time. There was no differentiation on the basis of treatment group membership or ability level. Counselors took special care to obtain the results for absentees as soon as they returned to school. However, no effort was made to follow up drop outs or transfers.

Career exploration summary scores. Two summary scales were developed from Career Guidance Survey items assessing various aspects of career exploration. The first scale, called the "Low Personal Initiative (LPI) Scale," included items tapping relatively casual exploratory behaviors (e.g., "Thought about my career future"; "Discussed jobs with a friend my age"). Two items, items 18 and 21, were allocated to this scale on an a priori basis. The remaining items were selected from items 5--16, which cover various types of exploratory behaviors. Initially, items from this group were also assigned to the LPI Scale on an a priori basis. As a cross-check on the casual nature of a behavior, items covering activities reported by more than half of the girls in the study were identified. Items not meeting this criterion were excluded from the LPI Scale.

The second scale summarizing exploratory behaviors was called the "High Personal Initiative (HPI) Scale." This scale included items indicative of a deliberate, concerted approach to career exploration (e.g., "Wrote for materials describing one of my job choices."). All items on the HPI Scale covered activities in which less than half of the students engaged.

The Career Guidance Survey item numbers included in the scales are as follows:

LPI Scale: 6, 8, 10, 12, 18, 21

HPI Scale: 5, 7, 9, 11, 13-16.

Separate scores for each scale were obtained for the two administrations of outcome measures. Thus, each student had two LPI scores and two HPI scores. Scores were reported as response averages ranging from 1.00 to 3.00 with 1.00

indicating no career exploration (a response of "A" to all items).

Allocation of occupational preferences to job families. Each student recorded her first and second job preferences by title at the time the VIP was administered and on the Career Guidance Survey. These preferences were then classified by project staff members into 1 of the 25 job families shown on the Job Family List in Figure 3. The 25 job families subsume all occupations in the Dictionary of Occupational Titles (U.S. Department of Labor, 1965).

Determination of science/technology occupational preferences. For purposes of the study, the following four job families were considered to fall in the area of science/technology: N. Engineering and Other Applied Technologies; O. Natural Sciences and Mathematics; P. Medicine and Medical Technologies; and Q. Social Sciences and Legal Services. Although Job Family Q does not include occupations in mathematics, natural science, and related technologies which were of major concern in the project, the job family was included because many of its member occupations do indicate a scientific orientation. A girl selecting a social science occupation in Job Family Q at age 14 may very well select an occupation in one of the other job families at age 20, particularly if she is encouraged to explore occupations in those job families.

Students were considered to have an occupational preference in science/technology if either their first or second occupational preference fell in Job Families N, O, P, or Q. Separate determinations were made for occupational preferences collected when the VIP was administered and for the two administrations of the outcome measures.

Determination of congruency between interests and preferences. As shown by Figure 2, each job family falls in one of 12 regions on the World of Work Map. The distance between regions on the map is an indication of the degree of similarity in the work tasks and work activity preferences involved (Prediger,

1976). Adjacent regions are the most similar. Regions on the opposite sides of the map are the least similar.

In order to determine the congruence between a student's occupational preferences and interests, as reported by the VIP, the distances between the regions corresponding to the student's first and second preferences and the student's VIP region were determined. Thus, if a student's first preference fell in region 4 and the student's VIP results fell in region 1, the congruence index would be 3. A student's congruence score was based on the average of the indices for the student's first and second occupational preference. Congruence scores range from 0 to 6 with 0 indicating complete congruence. Three scores were obtained, one based on preferences collected when the VIP was administered and one each based on the two administrations of the outcome measures.

Contacts with counselors. Counselors at each of the schools kept a record of the number of student-initiated contacts which focused on career exploration, career planning, and career decision-making concerns. Each counselor was supplied with an alphabetical list of students in the project. Beginning with the day on which VIP results were interpreted and ending with the second administration of the outcome measures, tallies were made for each student-initiated contact. These tallies were then summed for each student and became part of the student's project record.

Allocation of Outcome Measures to Objectives

Primary objective. As previously noted, the primary objective involved students possessing personal characteristics (abilities and interests) compatible with careers in science/technology. These students were defined as the subgroup of intervention and control group members who belonged to the science and technical interest strata--that is, students scoring highest on the VIP Science or Technical Scales. Approximately one-third of the students in the intervention and control groups met this criterion; sample sizes were 68 and 66, respectively.

Abbreviated statements of expected outcomes based on the primary objective are listed below. Following each statement, outcome variables and statistical analysis procedures are listed. The analysis procedures are described in a subsequent section. Unless otherwise noted, all analyses were conducted separately for the two sets of outcome measures (Set 1 and Set 2).

Outcome 1. Exploration of occupations in science/technology

a. Outcome variables

1. LPI and HPI Scales
2. Results for specific items on a scale if results for the scale were statistically significant
3. Contacts with counselors (no Set 1 analysis)

b. Statistical analysis procedures

1. LPI and HPI Scales: 2-way hierarchical analysis of variance with order of main effects as follows--treatment group, school
2. Specific items: z-test for difference between the proportion of intervention and control group students answering B or C to each of items 5-18 and C or D to item 21.
3. Counselor-recorded contacts: z-test for proportions contacting counselors

Outcome 2. Desire for information on science/technology careers

a. Outcome variables: Items 24 and 25

b. Statistical analysis procedure: z-test for proportions answering "yes" to items 24 and 25

Outcome 3. Preference for science/technology occupations

a. Outcome variable: First or second occupational preference in Job Families N, O, P, or Q

b. Statistical analysis procedure: z-test for proportions with preferences as defined above

Outcome 4. Certainty of science/technology occupational preference

a. Outcome variable: Item 4

b. Statistical analysis procedure: z-test for proportions answering A or B to item 4

Outcome 5. Certainty regarding preparation required for preferred occupation in science/technology

a. Outcome variables: Items 19 and 20

b. Statistical analysis procedure: z-test for proportions answering C or D to item 19; A to item 20

Outcomes 4 and 5 clearly involve only those girls with occupational preferences in science/technology. However, this is also true of Outcome 1 since all Career Guidance Survey questions concerning exploratory behavior focused on a student's first or second occupational choice. Questions concerning career exploration in general were not included in the assessment of outcomes in order to keep the Career Guidance Survey as short as possible and to avoid repetition.

Subsidiary objective. As previously noted, this objective involved all intervention and control group students. Statements of expected outcomes, outcome variables, and analysis procedures are listed below. Unless otherwise noted, all analyses were conducted separately for the two sets of outcome measures.

Outcome 1. Exploration of careers in general

a. Outcome variables

1. LPI and HPI Scales
2. Results for specific items on a scale if results for the scale were statistically significant
3. Contacts with counselors (no Set 1 analysis)

b. Statistical analysis procedures

1. LPI and HPI Scales: 3-way hierarchical analysis of variance with order of main effects as follows: treatment group, interest type, school

2. Specific items: See Outcome 1 under Primary Objective

3. Counselor-recorded contacts: See Outcome 1 under Primary Objective

Outcome 2. Congruence between preferences and interests

a. Outcome variables: Congruence score as previously described

b. Statistical analysis procedure: 3-way analysis of variance (see Outcome 1)

Outcome 3. Certainty regarding preparation required for preferred occupations

a. Outcome variables: Items 19 and 20

b. Statistical analysis procedure: See Outcome 5 under Primary Objective

Outcome 4. Reaction to interventions

a. Outcome variables: Items 29-31 (Obtained for Set 1 administration only; hence, reactions apply only to the VIP results.)

b. Analysis procedure: Determination of proportion of intervention group students giving each response to the items (control group had not received VIP reports).

Statistical Analysis Procedures

As noted in the section describing the sample, students were stratified by interest type and educational aspiration within schools and then randomly assigned to intervention and control groups. Hence, four levels of effects were potentially available for study: treatment, interest type, educational aspiration, and school. However, Table 2 shows that the number of cases per cell in this 4-way structure was often quite small. In order to increase cell counts, the educational aspiration dimension was eliminated from the analyses. Although stratification on this dimension did add an additional control to the analyses, the possibility of analyzing results according to this dimension was sacrificed to provide a firmer basis for the with-in cell variance estimates

used in analyses of treatment effects. Table 3 shows cell counts for treatment by interest type by school.

Primary attention in all analyses centered on intervention and control group differences. In each analysis, expected differences could be pre-specified on the basis of the statements of project objectives and expected outcomes. Hence, all analyses related to treatment effects involved 1-tailed tests of statistical significance. The 5% significance level was chosen to guard against the identification of treatment differences attributable to chance.

Each analysis of an outcome variable was conducted separately from analyses for other variables. In each analysis, all data available for the variable were used. Hence, sample sizes will vary slightly from analysis to analysis because of different rates of completion for items on the Career Guidance Survey. Approximately 92% of the 390 students completed the first set of outcome measures; approximately 89% completed the second set. As noted previously, students absent when the measures were administered were contacted later. However, no effort was made to contact dropouts or transfers.

Analyses of variance. The 2-way and 3-way analyses of variance (ANOVA) were conducted using the ANOVA subprogram in the Statistical Package for the Social Science (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). The ANOVA subprogram uses linear models for analysis of variance and, hence, is applicable to cases of disproportionality. Because treatment effects were of primary concern and because, in the sample design, the main effects for type of school and interest type were orthogonal to treatment, the hierarchical approach to ANOVA (Nie et al., 1975) was used. This approach (also called a stepdown or sequential analysis) is appropriate "if a logical a priori ordering exists among hypotheses to be tested" (Overall & Spiegel, 1969, p. 319).

Although type of school and interest type were included as stratification variables in the sample design in order to provide greater assurance of intervention and control group comparability, no hypotheses regarding differences

Table 3

Intervention (I) and Control Group (C) Sample Sizes for Outcome Analyses

Interest type	Urban school		Suburban school		Rural school	
	I	C	I	C	I	C
Social service	4	5	15	13	12	13
Business contact	4	3	9	11	5	4
Business detail	8	8	14	14	17	17
Technical	7	6	20	19	10	11
Scientific	8	8	12	12	11	10
Creative arts	9	10	17	18	13	13
Total	40	40	87	87	68	68

Note. The ratio of students with college vs. non-college aspirations was approximately the same for control and intervention group members of a given interest type at a given school. Thus, for the social service type, 10 of the 13 control group members at the suburban school (77%) had college aspirations and 11 of the 15 intervention group members (73%) had college aspirations, etc.

across schools or interest types were intended. However, the hierarchical approach to ANOVA requires that the order of analysis for main effects be pre-specified. In the 3-way ANOVAs, the order used in all analyses was as follows: treatment, interest type, school. In the 2-way ANOVAs, only the subgroup of students in the technical and scientific interest strata was involved. These students were treated as one group and the main effects hierarchy was as follows: treatment, school.

Comparisons of proportions. The 2-way and 3-way sample allocations used in the analyses of variance were maintained in comparisons of intervention and control group proportions. Estimates of the standard error of proportions were obtained by cell and then pooled across cells through a procedure described by Tate (1955, p. 446). Thus, in the analyses based on all students, the error estimates were based on data for 18 cells (6 interest types by 3 schools) for the intervention group and 18 cells for the control group. A minimum of five cases per cell was required. Standard *z*-tests for significance of difference between proportions were performed except when the available degrees of freedom indicated that *t* tests were more appropriate.

Results

The allocation of outcome variables to expected outcomes, the general design of the analyses, and the statistical procedures used in reaching conclusions concerning treatment effects were described in previous sections. Results of the analyses are reported below.

Results for Primary Objective

Although there were a few trends favoring the intervention group, none of the outcome analyses related to the primary objective revealed statistically significant differences. Hence, it cannot be concluded that project interventions were successful in stimulating exploration of, preference for, and planning toward science/technology careers by girls possessing personal characteristics (abilities and interests) compatible with such careers. For this reason, only a few of the results are reviewed.

Prior to receiving their VIP results, approximately 43% of the intervention group members and 46% of the control group members in the science and technical interest strata (Ns = 68 and 66, respectively) preferred occupations in science/technology. The corresponding figures one month and three months after receiving VIP results were as follows--intervention group 49% and 42%; control group 42% and 41%. Although, the VIP interpretation appeared to have some influence on preference for careers in science/technology, the subsequent group guidance sessions did not build on this base. This is surprising because of the focus of the sessions. However, Newton et al. (1976) obtained similar results with an extensive series of workshops.

Results for the certainty item (item 4) indicate that the group guidance sessions actually may have been counter productive. Prior to the group sessions, about 90% of the members of both treatment groups who preferred careers in science/technology indicated that they were very certain or fairly certain about their preferences. When the Set 2 measures were administered, 100% of the control group but only 75% of the intervention group gave these responses. In addition, fewer intervention group members than control group members in the science and technology interest strata wanted to find out more about careers in science following the group guidance sessions. When the Set 1 outcome measures were administered 70% of the intervention group and 60% of the control group answered "Yes" to item 25 on the Career Guidance Survey. The figures were 59% and 63%, respectively, when the Set 2 measures were administered. However, it should be noted that none of these trends were statistically significant.

Results for Subsidiary Objective

The primary objective of the 9th grade phase of the project focused on girls with abilities and inventoried interests appropriate to careers in science/technology. The subsidiary objective focused on all girls in the intervention and control groups, regardless of area of interest. The importance of the subsidiary objective in practical applications of the interventions was described in the section on objectives. Results of the analyses relevant to the subsidiary

objective are presented by outcome category.

Exploration of careers in general. Results of the 3-way ANOVAs conducted for the LPI and HPI scores are summarized in Table 4. On both sets of outcome measures there were statistically significant differences in treatment group means on the LPI Scale. The intervention group reported more career exploration activity than the control group. In both treatment groups, more exploratory activity was reported at the second administration of the outcome measures. The difference between the group gains was not significant, however.

There were no significant differences for the treatment groups on the HPI Scale; however, the differences across interest types were statistically significant for both Set 1 and Set 2 measures. The HPI means for the interest types (not shown in this report) indicate that students scoring highest on the Science Scale also score highest on the HPI Scale; that is, they engage in more noncasual career exploration activities. On the other hand, students scoring highest on the Business Detail and Technical Scales receive the lowest HPI means. (Similar trends were observed for the LPI means.) Although not directly relevant to project objectives, this outcome suggests that interest inventories might be used to identify students who are unlikely to engage in career exploration on their own. These students can then be given personal attention.

Treatment group responses to the items on the LPI Scale are summarized in Table 5. Statistically significant differences in favor of the intervention group were obtained for 4 of the 6 items on the Set 1 measures and 2 of the 6 items on the Set 2 measures. Of the 12 comparisons shown in Table 5, 10 are in favor of the intervention group. The results for item 8 illustrate one of the potential problems with the project design. Since girls within the same school were randomly assigned to experimental and control groups, "discussions with friends my age" were as likely as not to be between an experimental and control group member.

Table 4

Summary of Results for Analyses of Variance Related to Subsidiary Objective

Outcome variable	Treatment group: Intervention N	Intervention $\bar{X}$	Control N	Control $\bar{X}$	F value for main effects[a]: Treatment	Type	School
Set 1 measures							
LPI	186	2.28	175	2.16	6.43**	1.95	.21
HPI	186	1.48	175	1.44	1.26	3.12**	3.92*
Congruence[b]	184	2.03	184	2.28	3.65*	9.16**	2.14
Set 2 measures							
LPI	174	2.32	173	2.22	4.87*	1.59	.86
HPI	174	1.56	173	1.50	1.70	3.00*	1.58
Congruence[b]	173	2.22	173	2.20	.02	8.52**	.52

Note. Only one of the 18 2-way interactions were significant at the 5% level. None of the 6 3-way interactions were significant at the 5% level.

[a] As described in text, one-tailed tests were performed for treatment effects.

[b] A score of zero indicates complete congruence.

*$p < .05$

**$p < .01$

Table 5

Response Differences on LPI Scale Items for All Students

LPI items	Proportion with response indicating career exploration			
	Set 1 measures		Set 2 measures	
	Intervention	Control	Intervention	Control
6. Read a description of one of the jobs outside of school (public library, YWCA/YMCA, State Employment Service Office, newspaper, magazine, etc.).	.57*	.48	.64*	.52
8. Discussed the jobs with a friend my age.	.92**	.83	.88	.87
10. Discussed the jobs with a parent, relative, or guardian.	.91*	.85	.89	.85
12. Identified the school courses that it would be helpful to take for each of the jobs.	.79	.74	.85	.86
18. Have you given much thought as to why these two jobs are "right" for you?	.90	.92	.92	.88
21. During the past three weeks, have you spent more or less time than usual thinking about your career future?	.37*	.28	.43**	.31

Note. Sample sizes are given in Tables 3 and 4. An asterisk in the intervention group column indicates statistical significance. Proportions responding B or C are shown for items 6, 8, 10, 12, and 18. The proportion responding C or D is shown for item 21.

*$p < .05$, 1-tailed test.

**$p < .01$, 1-tailed test.

As previously noted, student-initiated contacts with counselors were also used as an index of career exploration. Counselors reported that 17% of the intervention group and 14% of the control group contacted them regarding career concerns between the VIP interpretation and administration of the Set 2 measures. This difference is not statistically significant. The relatively small proportion of student contacts with counselors may reflect the general absence of emphasis on career guidance at the 9th grade level in the schools included in the study. Indeed, the schools were chosen with this in mind in order to avoid the confounding of project effects with the effects of other guidance activities.

Congruence between preferences and interests. As shown in Table 4, a statistically significant treatment group effect appeared in the congruence scores obtained from the Set 1 measures. About one month after the VIP group interpretation, the occupational preferences of the intervention group were more congruent with measured interests than were the preferences of the control group. (Lower scores indicate more congruence.) However, three months after VIP interpretation, the congruence scores for the two groups were essentially the same.

Congruence scores were also available for occupational preferences collected when the VIP was administered. The means for the pre-VIP, Set 1 and Set 2 congruence scores are as follows:

Intervention Group: 2.33, 2.03, 2.22

Control Group: 2.18, 2.28, 2.20

These data indicate that the VIP interpretation produced an increase in congruence after one month but that this increase was not maintained at the end of three months. It should be recalled that following the VIP group interpretation, project interventions no longer involved the VIP reports.

Certainty regarding preparation for preferred occupations. Although trends in the data favored the intervention group, there were no statistically significant

Table 6

Intervention Group Reactions to Vocational Interest Profile Reports

Items assessing reactions	Proportion marking each item response
29. What did you learn from the report?	
A. I didn't pay any attention to the report.	.07
B. It suggested careers I had not thought about before.	.41
C. It backed up the career choices I had already made.	.31
D. It told me what career I should enter.	.12
E. It didn't make any sense so it wasn't helpful.	.09
30. Do you see more career possibilities for you now than before you received your report?	
A. Yes.	.69
B. No	.31
31. Do you believe that other students should be given the chance to take the Vocational Interest Profile (VIP) and get a "World of Work Map" report?	
A. Yes.	.93
B. No	.07

Note. Results are based on the responses of the 165 intervention group members. Of the 30 not responding, 16 did not recall receiving a VIP report. Most of the others were absent when the Career Guidance Survey was administered.

Discussion and Recommendations

The outcome analyses indicate that a brief report of vocational interest results can stimulate career exploration on the part of 9th grade girls and increase congruence between measured interests and occupational preferences. Although the statistically significant differences between intervention and control groups were not large, they were similar in magnitude to differences reported in other studies of the effects of interest inventories (e.g., Krivatsy & Magoon, 1976; Redmond, 1972; Zenner & Schnuelle, 1976). This finding is particularly encouraging because, contrary to the previous studies, this study used a non-sex-restrictive interest inventory. Thus, the stereotypic occupational preferences held by many girls in the study were not reinforced by the interest reports. Nevertheless, over 90% of intervention group members indicated that receiving the reports was a worthwhile experience.

Project results also suggest that continued attention to interest inventory reports is needed if the increased congruence between measured interests and occupational preferences resulting from a one-session group interpretation is to be maintained over several months. Interest inventory reports might be most effective if they are embedded in an ongoing guidance program that makes repeated reference to the reports.

The analyses of project outcome measures did not indicate that the interventions were effective in increasing the number of 9th grade girls who explore and express a preference for careers in science/technology. Hence, implementation of project interventions for this purpose can not be recommended. It may well be unrealistic to expect brief interventions, put into the context of 14 years of sex-role socialization and an environment that remains constant, to influence girls to consider careers in science/technology. More continuous, pervasive interventions appear to be required. Perhaps developmental career guidance

programs that encourage a wide range of exploratory experiences beginning in the primary grades and following through to high school graduation provide the most promise for increasing the number of high school girls who consider nontraditional careers.

12TH GRADE STUDY

Objectives

The primary objective of the 12th grade phase of the project was to determine whether a low-cost, direct mailing of personally relevant materials about careers in science and technology will stimulate exploration of, preference for, and planning toward science/technology careers on the part of college-bound women possessing personal characteristics compatible with such careers. Expected outcomes were as follows:

1. More exploration of occupations in science/technology.
2. More girls wishing to obtain additional information on careers in science/technology.
3. More girls preferring occupations and college majors in science/technology.
4. Greater certainty of preference on the part of those girls preferring occupations in science/technology.
5. Greater certainty regarding preparation required for preferred occupations in science/technology.
6. More girls planning to take science and mathematics courses during their first year of college.

The primary objective focuses on able girls who also have inventoried interests compatible with careers in science/technology. However, it is possible that level of interest has little relationship to the effectiveness of the interventions. Hence, a subsidiary objective of the primary objective was to determine whether any intervention and control group differences observed for girls with high measured interests in science/technology were also present for girls with low measured interests in science/technology. The expectation was that no treatment effects would be observed for the low interest groups. Outcome variables were identical to those listed above.

The secondary objective of this phase of the project was to identify the perceived barriers, information needs, and facilitating factors related to the consideration of careers in science/technology as identified by college-bound women with potential for such careers. Procedures and results related to this objective are reported in the section entitled "Barriers, Facilitating Factors, and Information Needs . . . ."

Procedures

Overview of Design

A one-year experimental study was conducted among 12th grade women who took the ACT Assessment on the October 1975 national test date. Several screening variables were applied to produce a pool of 1,017 college-bound women not planning majors in science or technology but who had high ability test scores and grades in science and math. Two subgroups of this pool were identified: students with high measured interests in science or technology and students with low measured interests in this area. Within each subgroup, students were randomly assigned to intervention and control groups. The resulting four cells in the design were labeled Group 1, Control, Low Interest; Group 2, Intervention, Low Interest; Group 3, Control, High Interest; and Group 4, Intervention, High Interest. Figure 4 provides an overview of the study design and sample allocations.

Both intervention and control groups received the usual ACT Assessment score report and interpretative booklet according to the regular schedule. No other communication with the control groups occurred until the project outcome measures were administered in the spring of 1976.

Beginning in January 1976, intervention group members received two mailings. The first mailing contained a letter calling attention to the recipients' high ability in science and mathematics. Letters to women in the high interest intervention group also made note of their high interest scores in science and technology as determined by the ACT Interest Inventory (Hanson,

1974), one of the components of the ACT Assessment. Letters to women in the low interest intervention group made no reference to interest scores. Enclosed with each letter was a copy of a booklet entitled Women in Science and Technology: Careers for Today and Tomorrow (to be described), a list of examples of science and technology programs at colleges of each person's choice, and a postcard for use in obtaining additional information in scientific or technical fields. The second mailing was a letter containing a reminder about the first mailing, a list of resource books and materials on career planning, and another invitation to return the postcard requesting additional information on specific occupations. Late in the spring of 1976, identical outcome measures were administered to each treatment group. The overall total response rate was 94%.

Sample and Instruments

College-bound senior women not planning college majors in science/technology (as determined by an inventory of plans included in the ACT Assessment) but with personal characteristics compatible with such careers were identified from among the women (N = 114,255) taking the ACT Assessment on the October 1975 national test date.

The ACT Assessment (ACT, 1973, 1976; Hanson, 1974) includes a vocational interest inventory, an inventory of student background and plans, and the following four tests of educational development: English Usage, Mathematics Usage, Social Studies Reading, and Natural Sciences Reading. The ACT Assessment Program and related services are used each year by approximately one million students and over 25,000 educational institutions.

In order to identify appropriate students for the study sample, screening was conducted on the following variables:

1. Year in school. Only high school senior women were included in the study. Approximately 93% of the 114,255 females taking the ACT Assessment in October 1975 were seniors.

2. Release of student data. Only those students were selected who indicated on the ACT Assessment that they wished to be informed about educational opportunities, programs, or benefits that match their individual needs and interests. Approximately 89% of students expressed a desire to receive such information.

3. Program of study. Excluded from the sample were all women who indicated that they planned a program of study in a field of science or technology. Figure 5 shows the list of college majors and occupational choices from which students selected a code number corresponding to a program of study. Programs of study defined by this project as fields of science or technology are starred. Because of the age and educational plans of the students in this phase of the project, the definition of science/technology fields was not as broad as the definition used in the 9th grade study. Thus, social sciences were not included as a field of science and technology. However, educational programs in the health area were included, even though some of these programs are service- rather than science-oriented. This decision was made because it is likely that college-bound students considering a service-oriented health field may later consider a science-oriented field. In general, careers in science/technology were defined to mean careers in natural science and technology in the 12th grade phase of the project.

4. High school natural science and mathematics grades. Included in the sample were only those women who reported an average high school grade in natural science and mathematics of B or A. The high level of accuracy of self-reported high school grades has been documented by Maxey and Ormsby (1971).

5. ACT Natural Science and Mathematics Test scores. The women included in the sample had percentile ranks on national norms for college-bound women of 88 or above on the ACT Natural Science Test (equivalent to an ACT standard score of 28 or higher) and percentile ranks of 62 or above on the ACT Mathematics Test (equivalent to an ACT standard score of 18 or higher).

6. World of Work Map regions. As described by Hanson (1974), a World of Work Map region "score" based on ACT Interest Inventory results is obtained for each student who completes the ACT Assessment. (It will be recalled that a student's map region formed the basis for the interest inventory intervention used in the 9th grade study.) Included in the two high interest groups were all women whose interests fell in regions 7, 8, or 9--regions typified by interests in technical, scientific, and creative activities. As shown by Figure 2, the job families in or near these regions are as follows: Engineering and Other Applied Technologies; Natural Sciences and Mathematics; Applied Arts (Visual), and Medicine and Medical Technologies. Included in the two low interest groups were all women whose interests fell in regions 1, 2, or 3--regions typified by interests in the social service, business contact, and business detail activities. Job families in or near these regions are as follows: Retail Sales and Services; Promotion and Direct Contact Sales; Management and Planning; Paying, Receiving, and Bookkeeping; and Clerical and Secretarial Work.

7. Allocation of students to intervention and control groups. Of those women remaining in the pool after the previously listed screening criteria were applied, 676 had region scores of 1, 2, or 3 and 1,672 had region scores of 7, 8, or 9. About three-fourths (507) of the young women in regions 1, 2, or 3 were randomly selected for membership in the two low interest groups. (In the sample design, the low interest groups were allocated about 250 members each.) Selections for the high interest group were then made in relation to the ability levels of members of the low interest groups, as described below.

It seemed likely that girls with high science, technical, and creative interests might have greater science-related ability than girls with low interests in these areas. For example, the number of high ability girls with interests in regions 7, 8, and 9 (1,672) was much greater than the number in regions 1, 2, and 3 (676). To insure that the distribution of ability in the low

interest groups was similar to that in the high interest groups, students were first ranked on ACT Natural Science test scores: A count was then made of women at each ability level in the low interest group, and approximately the same number of women were randomly selected from each ability level of the high interest group. The 507 women in the low interest group were randomly assigned within each ability level to control and intervention groups. The 510 women with high science-related interests were also randomly assigned within each ability level to control and intervention groups. The four groups are shown in Figure 4 as basic elements in the design of the study.

Ninety-three percent of those in the initial sample completed and returned a full-length set of outcome measures. An additional 1% gave telephone responses to five of the more important questions about their college major plans. Table 6 shows initial and final sample sizes.

Interventions

Each young woman in the intervention groups received at least two intervention mailings prior to the administration of the outcome measures (see Figure 4). The first mailing was made on January 12, 1976; the second, on February 18, 1976. For those young women who returned a postcard requesting additional materials, a third mailing was made as soon as the request was received. Materials for each of the three mailings are briefly described below.

First mailing. The first mailing consisted of four items: (a) a cover letter (Appendix C); (b) a booklet, Women in Science and Technology: Careers for Today and Tomorrow (Appendix D); (c) a computer-generated personalized list of majors or groups of courses in science and technology offered at each of the colleges selected by the student when she took the ACT Assessment; and (d) a return postcard to request more specific information about any of eight areas of science/technology (e.g., life sciences, engineering).

Table 6

Initial and Final Sample Sizes by Treatment Group

	Control group		Intervention group		
	Low interest	High interest	Low interest	High interest	Total
Initial sample	254	255	253	255	1,017
Number returning outcome measures	233	241	228	241	943
Number giving 5 responses by telephone	8	0	4	1	13

Note. Not all students completed all items on the outcome survey. Hence, Ns differ slightly from item to item.

Development of careers booklet. A thorough search was conducted for a suitable brochure or booklet to include in the first mailing to the intervention groups. Several criteria was established for selection of an appropriate publication:

1. Women must be depicted in a positive manner.
2. Pictures of women in a range of scientific and technological careers should be presented.
3. Careers for women should not be singled out as peculiarly different from those for men.
4. The assumption of changing roles for men and women should be present, suggesting that housework and child rearing are not the sole responsibilities of women and that not all women have chosen to play this role in the past.
5. The format should be easy to read, light, attractive, and appropriate for high school girls.
6. The booklet should be inexpensive.

Letters were sent to 164 professional associations and governmental agencies, to 15 educational agencies (e.g., colleges and universities), and to 15 private companies. Numerous telephone calls were also made to these and other agencies and companies. Responses and materials were received from over 150 agencies, but no suitable brochure or booklet was found. Subsequently, ACT decided to develop its own booklet. Women in Science and Technology: Careers for Today and Tomorrow was produced for use in the project (see Appendix D).

The 16-page, illustrated 8½ x 11" booklet was designed especially for young women with academic potential for careers in science and technology. The purpose of the booklet was to help young women feel more comfortable with the exploration of careers in traditionally male dominated areas, particularly science and technology, and to suggest new ways of thinking about themselves, their careers, and the new options open to women today. The text consisted

of pictures of women role models, quotations from women professionals and students in science and technology, and discussions of sex barriers, myths, and realities. A short guide to career planning, a checklist review of major ideas, and a list of resources conclude the booklet.

Second mailing. The second mailing to members of the intervention groups was a letter reminding group members of the earlier mailing, adding a few additional suggestions about planning for a college major and a career (e.g., "talk to women workers"), and inviting the return of the postcard enclosed in the first letter.

Third mailing. Those women who returned the postcard requesting additional information were sent the appropriate Occupational Outlook Handbook (U.S. Department of Labor, 1974-75) reprints and a cover letter which listed ten additional resources that could be used for planning college majors and careers.

Outcome Measures

As shown by Section I the Career Guidance Survey (Form B) in Appendix E, the outcome measures used in the 12th grade phase of the project were highly similar to those used in the 9th grade phase although the sequence of items was altered somewhat. Development of the second and third sections of the survey is described in the section of this report entitled "Barriers, Facilitating Factors, and Information Needs Related to the Consideration of Careers in Science."

Outcome data were collected from intervention and control groups in April, May, and June 1976. Beginning in early April, each of the 1,017 subjects received identical mailings. A pre-mailing postcard preceded the initial mailing of the Career Guidance Survey and announced to each recipient the upcoming arrival of an important questionnaire. Cooperation was solicited in the postcard for a quick response to the questionnaire. Four days later, the Career Guidance Survey, a cover letter, and a return postage paid evelope was mailed. Next, a follow-up postcard was sent to all nonrespondents. Students not responding by mid May received a second follow-up mailing consisting of another copy of

the survey, a cover letter, and another return envelope. Beginning on May 28, telephone calls were made to all nonrespondents to urge them to return the questionnaire and to obtain basic items of data. June 28 was the final cut-off date for the receipt of outcome data. As a result of these efforts a 93% response rate to the questionnaire and a 94% total response rate was obtained. Initial and final sample sizes are shown in Table 6.

The specific outcome measures obtained from Career Guidance Survey items are briefly described below.

Career exploration summary score. In the 9th grade phase of the project, two summary scales were developed from Career Guidance Survey items assessing various aspects of career exploration--a "Low Personal Initiative (LPI) Scale" and a "High Personal Initiative (HPI) Scale." More than 50% of the college-bound girls engaged in nearly all of the career exploration items (Items 11 - 22 on Form B of the Career Guidance Survey). Hence, it was not possible to form an HPI Scale. The following items were scored on the LPI Scale: 11, 12, 14 - 18, 22, 24, and 27.

Determination of science/technology occupational preferences. With the exception that occupational preferences falling in Job Family Q, Social Sciences and Legal Services, were not considered to be in the fields of science and technology, procedures for determining whether the college-bound students preferred occupations in science and technology were similar to those used in the 9th grade phase of the project. The rationale for excluding Job Family Q was discussed previously.

Determination of college majors in science or technology. Item 28 on Form B of the Career Guidance Survey asked the student to print the name of the program of study she is considering. In item 29, she records the number listed by the program on page 6 of the Survey. The list of programs and numbers is shown in Figure 5 and asterisks appear by the program of study defined as belonging to the fields of science and technology. (Asterisks did not appear on the Survey.)

Allocation of Outcome Measures to Objectives

The expected outcomes were nearly identical for the primary objectives in the 9th grade and 12th grade phases of the project. In the 12th grade phase, Outcome 3 adds preferred college majors in science and technology to preferred occupations in these fields. Outcome 6, which was not assessed in the 9th grade study, is assessed by responses to items 30 and 31 of the Career Guidance Survey, Form B. Readers are referred to the description of the 9th grade study for specifics on the allocation of outcome measures to the other objectives.

Statistical Analysis Procedures

Two stages of statistical analyses were planned. The first set of analyses involved treatment group members with high interests in science-related activities and, hence, were relevant to the primary objective. If differences in favor of the intervention group were found for an outcome variable, the analyses were to be completed for treatment group members in the low interest groups. Hence, the second set of analyses were relevant to the subsidiary objective.

All analyses involved the comparison of two groups, i.e., intervention and control groups. Hence, z-tests for significance of differences between means and proportions were used in the statistical analyses, depending on the nature of the outcome measure. In each analysis, all data available for the measure being analyzed were used. Hence, sample sizes varied slightly from analysis to analysis. As in the 9th grade phase of the project, expected differences could be prespecified for each analysis on the basis of the statements of project objectives and expected outcomes. Hence, all analyses used 1-tailed tests of statistical significance. As in the 9th grade study, the 5% significance level was chosen to guard against the identification of treatment differences attributable to chance.

Results and Recommendations

Results related to the primary objective can be summarized quite briefly. In the ten analyses conducted for the high interest group, only one statistically

significant difference between the intervention and control groups was observed. In view of these results, no analyses related to the subsidiary objective were performed. A reasonable conclusion is that the interventions had no appreciable effects on the college-bound students in the study. For this reason, only a few of the results for the high interest groups are presented below.

Scores on the LPI Scale averaged 2.23 for the intervention group and 2.30 for the control group, which suggests that the interventions do not stimulate more career exploration. Approximately 26% of the intervention group and 22% of the control group were planning majors in science/technology at the conclusion of the study. Although both percents were much larger than those obtained for the low interest groups (4% and 6% respectively), the difference was not statistically significant. The one statistically significant intervention-control group difference indicated that more intervention group members (87%) than control group members (79%) were planning to take courses in science. However, more control group members (86%) than intervention group members (83%) were planning to take math courses, although this difference was not statistically significant. Finally, only 52 of the 255 girls in the high interest intervention group returned postcards requesting information about careers in science and technology. Although this was nearly twice as many responses as were received from the low interest group (27), it represents only about one-fifth of the intervention group members.

Results for the 12th grade phase of the project clearly indicate that implementation of the project interventions cannot be recommended. The simple, inexpensive procedures that were tested were not useful in counteracting the effects of sex-role socialization on the career plans of college-bound girls. Whether more intensive procedures will be effective remains to be seen. Because such procedures are likely to be costly in terms of the number of persons they reach and difficult to implement on a broad scale, they should be thoroughly tested before large amounts of federal money are invested in their implementation.

BARRIERS, FACILITATING FACTORS, AND INFORMATION NEEDS RELATED TO THE CONSIDERATION OF CAREERS IN SCIENCE

Student perceptions of barriers, facilitating factors, and information needs related to the consideration of careers in science and technology were separately investigated in the 9th and 12th grade studies. The results of these studies and their implications are discussed below.

12th Grade Study

Development of Survey Items

Results for the twelfth grade study are based on data from Sections II and III of the Career Guidance Survey, Form B. These sections of the Career Guidance Survey were developed with the help of groups of local high school girls from four different schools. After preliminary versions of Section II and III were developed, two groups of six or seven upper ability 11th and 12th grade girls were asked to respond to the questions and to discuss related issues. The questions were subsequently revised and similar sessions were held in a different school with two additional groups of girls. After another revision, a third set of pretesting and discussion sessions were held. No student participated in more than one session.

Each discussion lasted approximately one hour. At the beginning of the discussion, students were asked for their perceptions of situations or attitudes which encourage or discourage young women's interest in science/technology careers. Following administration of the survey, suggestions for improving the items were elicited. After each tryout, the instrument was revised to reflect comments and suggestions made by the participants. The third revision was further shortened to reduce the overall length of the instrument.

Sample and Response Analyses

The national sample of college-bound students and the survey procedures were described in the previous discussion of the 12th grade study. Because

preliminary examination of the data revealed similar responses from each of the four treatment groups described earlier, the four groups were combined into one group for analysis. Hence, the results presented below are based on the responses of over 90% of 1,017 college-bound girls in the treatment and control groups. (The number of responses varied slightly from item to item.) Results of the survey were summarized by item. No tests of statistical significance were conducted.

Results

Perceptions of barriers. The 12th grade girls were asked for their perceptions of situations or attitudes that account for the fact that fewer girls than boys seriously consider science and technology careers. Ratings were requested on a scale ranging from 1 ("of little importance") to 5 ("very important") with a midpoint of 3 ("important"). The highest average ratings of importance were given to perceptions of possible home-career conflicts (3.42) and difficulty of preparation for a science career (3.31). Means and standard deviation for each of the 14 items are presented in the first two columns of Table 7.

After rating the list of 14 possible barriers, girls were invited to list any other important reasons which had been omitted. Additional reasons why fewer girls than boys consider science and technology careers were provided by 140 girls. Responses were grouped into five main categories; lack of interest (41%), lack of ambition or motivation (21%), parents' or friends' opinions (11%), opposition from men (5%), and miscellaneous factors (21%). Girls were asked to select the most important barriers from the total list, including their own open-ended responses represented by item 15. Rated most important by 24% was worry about combining family responsibilities with the demands of a career. Rated most important by 18% and 16% respectively were statements that preparation for a career in science seems to be very hard,

Table 7

Importance of Barriers to Pursuit of Careers in Science/Technology

Item	Ratings of importance		Number (%) indicating item was--			
			Most important		Among 3 most important[a]	
	Mean	SD	N	%	N	%
12. Girls worry about combining family responsibilities with the demands of a career.	3.24	1.24	228	24%	507	55%
5. Preparation for a career in science seems to be very hard, long, and expensive.	3.31	1.32	170	18	443	47
7. Counselors and teachers don't encourage girls to consider science/technology careers.	3.21	1.29	113	12	402	44
4. Girls don't get enough information about science and technology careers.	3.18	1.28	148	16	357	39
6. Girls aren't aware of women scientists who might encourage them to think about science careers.	3.00	1.13	38	4	184	20
8. People think science isn't an appropriate career for girls.	2.59	1.33	56	6	178	19
11. Girls expect discrimination in college admission, education, and employment.	2.50	1.25	46	5	176	19
13. People think that girls are less capable and hard working than boys.	2.47	1.32	28	3	119	13
3. Few female scientists are mentioned in class.	2.39	1.20	5	1	65	8
10. Some girls are unwilling to be one of the first women in an "all male field."	2.24	1.17	23	3	109	12
2. Most science teachers are male.	2.07	1.11	3	.3	34	3

Table 7 (cont.)

Importance of Barriers to Pursuit of Careers in Science/Technology

Item	Ratings of importance		Number (%) indicating item was-- Most important		Among 3 most important[a]	
	Mean	SD	N	%	N	%
14. Girls do not consider themselves bright and talented enough to succeed.	2.05	1.28	33	4%	99	11%
9. Girls think women scientists are unfeminine.	1.83	1.08	9	1	36	4
1. Men are usually pictured in science textbooks.	1.66	.96	3	.3	15	2
15. Can you add any other important reasons to the list above?[b]			29	3	49	5

Note. N = 943; however the sample size varied slightly from item to item.

[a]The column totals approximately 300% because most respondents selected three items. Percentages refer to the proportion of girls who selected an item as one of the three most important barriers.

[b]There was no rating for this open-ended item.

Table 8

Number and Percentage of Respondents Reporting

Personal Impact of Barriers

Item		N	%
5.	Preparation for a career in science seems to be very hard, long, and expensive.	150	46%
12.	Girls worry about combining family responsibilities with the demands of a career.	112	35
4.	Girls don't get enough information about science and technology careers.	77	24
7.	Counselors and teachers don't encourage girls to consider science/technology careers.	58	18
14.	Girls do not consider themselves bright and talented enough to succeed.	32	10
6.	Girls aren't aware of women scientists who might encourage them to think about science careers.	28	9
8.	People think science isn't an appropriate career for girls.	24	7
11.	Girls expect discrimination in college admission, education, and employment.	24	7
10.	Some girls are unwilling to be one of the first women in an "all male field."	23	7
15.	Can you add any other important reasons to the list above? (Open ended responses in 5 categories)	21	7
13.	People think that girls are less capable and hard working than boys.	15	5
3.	Few female scientists are mentioned in class.	9	3
2.	Most science teachers are male.	5	2
9.	Girls think women scientists are unfeminine.	4	1
1.	Men are usually pictured in science textbooks.	3	1

Note. N = 323; columns total more than 100% because respondents could mark more than one response.

Table 9

Importance of Factors Facilitating the Pursuit of Careers in Science/Technology

Item	Ratings of importance		Number (%) indicating item was-- Most important		Among 3 most important[a]	
	Mean	SD	N	%	N	%
4. Encouragement from family to fulfill individual potential.	3.90	1.01	237	26%	635	69%
1. Extra encouragement and help from teachers.	3.64	1.09	125	14	452	49
3. Changing attitudes about what is appropriate work for women.	3.56	1.07	161	17	503	54
6. Importance of science in solving some of the world's problems.	3.54	1.04	103	11	352	38
2. A special challenge to succeed in science because some people believe girls can't.	3.18	1.21	91	10	275	30
5. The likelihood that a science career is a good way to achieve status and wealth.	2.72	1.12	168	18	478	52
7. Can you add any other important reasons to the preceding list?[b]			39	4	56	6

Note. N = 943; however, the sample size varied slightly from item to item.

[a]The column totals approximately 300% because most respondents selected three items.

[b]There was no rating for this open-ended item.

careers. All of the 14 types of information listed on the questionnaire received an average rating that was higher than 3.0 ("important"). Results are shown in Table 10.

9th Grade Study

Sample and Instrument

Data on barriers and information needs perceived by 9th grade girls were collected in a questionnaire administered in March 1976. Approximately 80% of the 530 girls in the 9th grade phase of the project responded to the questionnaire although the number differed slightly from item to item. Because responses were similar for the intervention and control groups, results for all 9th grade girls of above average ability were combined. Criteria for membership in the various 9th grade samples were described in the previous discussion of the 9th grade study.

The questionnaire used in the study appears in Appendix F. The questions and procedures for responding to the questions differed somewhat from those used in the 12th grade study because of the younger age level and less stringent academic criteria employed in selecting the 9th grade sample. Hence, results for the 9th and 12th grade studies are not directly comparable. As in the 12th grade analysis, responses to the questionnaire were summarized by item and no tests of statistical significance were conducted.

Results

Facilitating factors. To provide the proper frame of reference for the 9th grade survey, students were first introduced to a fictitious high ability 9th grade girl who is seriously considering a career in science. They were then encouraged to provide open-ended responses to a question concerning the factors that might encourage the girl to plan a science career. Several commonly identified factors were listed as examples (see Appendix F). Of the 187 open-ended responses, the largest number fell into the category of enjoyment of science and math (62%) or desire to enter science (24%). The remaining scattered

Table 10

Ratings of the Usefulness to Girls

Of Various Types of Information

Item		Mean	SD
6a.	Job opportunities for women in the future.	4.24	.85
4a.	What high school courses and college majors are required.	4.14	.84
5b.	How your educational expenses might be financed.	4.13	.88
4b.	Length of training required for different types of science careers.	4.09	.84
3b.	What it's like "on the job" in a science career.	4.07	.86
5a.	How expensive training might be.	3.95	.93
4c.	How difficult preparation might be.	3.93	.98
6c.	Ways women can combine family life and a successful career.	3.91	1.11
3c.	What makes science careers exciting and interesting.	3.79	.99
5c.	Probable income in a science career.	3.60	.96
6b.	Equal opportunity laws designed to help women considering science careers.	3.57	1.06
2.	General descriptions of science careers.	3.50	1.01
3a.	What it's like to be a woman in science.	3.42	1.12
1.	Information on where booklets, "briefs," etc. describing science/technology careers are available locally.	3.39	1.03

Note. N = 934; however, the sample size varied slightly from item to item.

responses included good pay, encouragement of friends, availability of jobs, high grades in science and math, and money available for college.

Perceptions of barriers. Information on barriers was obtained by again referring to a fictitious high ability girl. A list of 10 factors that might discourage her from pursuing such a career was presented with instructions to check factors most likely to cause her to choose a nonscience career instead. Respondents perceived the most important discouraging factors to be others' beliefs that girls are not capable of succeeding in a science career (51%) and discouragement by friends from entering school science courses (48%). Table 11 presents percentages of girls selecting each barrier.

Information needs. Respondents were presented with a list of nine types of information and were asked to check which types would be most useful to girls considering science careers. Types of information checked as most useful were knowledge of necessary high school and college courses (83%) and what it's like "on-the-job" in the science career (78%). As shown in Table 12, all of the types of information were checked as being useful by at least 49% of the respondents.

Discussion and Implications

The results of these two studies suggest that young women need help to resolve perceived role conflicts between their future careers and family life, and that they need a more positive perspective on preparation for and entry into science fields. Because of the nationwide representation of highly talented girls in the 12th grade sample, the discussion of the results and their implications will focus on this sample.

Several empirical studies have reported the presence of a home-career conflict among women. For example, Smith, Stroup, and Coffman (1975) found that, when presented a list of possible barriers women face in pursuing professional careers in science, their sample of 139 first year college students rated the home-career conflict to have more effect on their own and other women's career

Table 11

Number and Percentage of Ninth Grade Girls

Identifying Various Barriers to Science Careers

Item		N	%
18.	People think that girls are not capable of succeeding in a science career.	268	51%
13.	Friends discourage girls from entering school science courses.	254	48
12.	Girls don't know any women in science who can tell them more about it.	250	47
19.	Girls do not think a woman can have both a family and a science career.	242	46
14.	Girls are discouraged by friends from joining school science clubs and activities.	230	43
16.	Parents discourage girls from planning science careers.	217	41
10.	Girls do not have much information about science careers.	199	38
11.	Girls do not know what courses are needed to prepare for science careers.	185	35
15.	Counselors and teachers discourage girls from planning science careers.	175	33
17.	Girls think women in science are unattractive and masculine.	154	29

Note. Columns add up to more than 100% because girls could choose any number of items.

Table 12

Number and Percentage of Ninth Grade Girls

Who Identified Needed Types of Information

Item		N	%
24.	What high school and college courses are needed for this career.	440	83%
23.	What it's like "on-the-job" in this career.	412	78
25.	How long the training for this career might be.	373	70
28.	Future opportunities for women in this career.	369	70
27.	The salary of a person in this science career.	360	68
26.	How expensive the training might be.	355	67
29.	How a woman can combine a family with this career.	294	56
22.	What it's like to be a woman in science.	289	55
21.	What other girls who are preparing for this career say about it.	257	49

Note. Columns add up to more than 100% because girls could choose any number of items.

plans than other types of barriers. This conflict was found to be even more pronounced among women who chose nonscience or traditionally female science careers than among those who selected traditionally male science careers.

Hawley (1971) found that women's conflicts between pursuing a career and filling the role of a wife and/or mother are colored by their concern about what men think of their chosen life styles. Similarly, in a study of women's views of career and marriage, Matthews and Tiedeman (1964) found that women's developing life styles were affected by their perceptions of male attitudes toward their use of intelligence, by their view of homemaking in relation to the presumably dominant position of men, and by other role conflicts. Kirk (1975) found that in her sample, the type of information most frequently desired by high school girls was the kind of life style possible with given jobs.

Regarding the second major barrier identified in the 12th grade study, Kirk also noted the need for better information and more positive perspectives on preparation for science careers. Concern over courses, grades, and abilities was found to be an important factor in discouraging interest in science careers. In a nationwide study of high school students' opinions about science as a career, Erlick and LeBold (1975) found that 34% of girls who wanted to become scientists but felt they could not, attributed their reluctance to their own lack of preparation in school courses, to poor grades in science, and to the belief that adequate preparation would be too hard and too long.

Data in the present study suggest that encouragement from family and extra help and encouragement from teachers might be influential in helping change girls' perceptions of barriers. Luchins (1975) found teachers to be more influential than friends or parents in encouraging girls in mathematics. Similarly Kirk (1975) found that approximately 75% of her sample rated teachers as one of the strongest influences in encouraging interest in science. Kirk's

sample also rated high the need for information about required education and training.

Since many of the findings in the present study are supported by results from earlier studies, these data can serve as the basis for speculation about strategies for helping capable girls expand their career options to include science and technology. The importance which the girls attached to encouragement from their families should be emphasized. Mailings to parents of capable girls about their daughters' potential in science, about the need to help girls explore careers in areas previously dominated by men, about the importance of changing attitudes concerning what is appropriate for women might be even more important than information directed to the girls themselves.

Teachers in science and mathematics should be informed of the significance of their role in the career development of girls. It is not surprising that girls rate teachers' reactions as important as their parents' reactions in affecting their interests and plans. During the high school years, teachers serve as one of the major sources of feedback outside the home concerning the students' abilities and behaviors. Since high school students cannot avoid making decisions about their future studies and possible careers, teachers should help students expand their options according to their abilities and goals, rather than restrict them to stereotyped ideas about traditional careers and life styles of women.

The perceived difficulty in preparing for a science career was considered to be a major barrier by the 12th grade girls in the study. A possible explanation is that the girls are not aware of the real nature of the preparation involved; e.g., that although courses are demanding, they can be mastered by the capable, well-motivated young woman. This speculation is supported by the fact that girls rated knowledge of high school courses and college majors as one of the most useful types of information in planning a science career.

Typically, high school teachers and counselors serve as the major source of this important information. The lack of encouragement girls perceive may in part be attributed to this lack of information about preparation. If teachers and counselors can provide encouragement by making information available about courses and careers, these efforts might go a long way in making science careers appear possible and attractive to high school girls.

Girls may also perceive that preparation for science careers is too difficult because they lack awareness of women scientists who have "made it," another one of the major barriers identified in the study. The importance of role models in encouraging exploration of new behaviors has been well documented. Young women scientists might be used to convey the view of a science career as an attainable goal. Efforts to help girls become more aware of women in science might also take other forms. References to women scientists in books and by educators might help to change girls' perceptions of science as an appropriate field for women. Information for parents might include references to specific women scientists.

Emphasis on the need for information about science and technology careers appeared in responses throughout both studies. Respondents indicated that a wide variety of information would be very useful to girls considering science and technology careers. Science teachers, math teachers, and the school guidance office can provide much of the information that is desired.

In summary, the results of the two studies of barriers, information needs, and facilitating factors suggest several major reasons relatively few girls choose science careers: They have doubts about combining family life with a science career; they lack information about steps in preparing for a science career; they believe preparation to be long and difficult; they receive inadequate encouragement from influential adults and they see few examples of the important role women can play in science. Several possible ways for overcoming barriers to the consideration of science careers were suggested.

Appendix A

Vocational Interest Profile Report Form
(Explore Your Career Options)

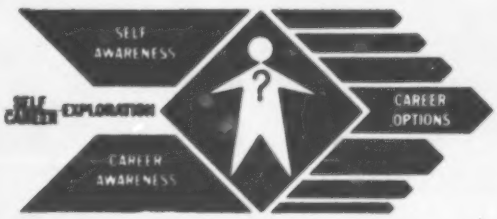
Using Your ACT Vocational Interest Profile** (VIP) **Report

To

EXPLORE YOUR CAREER OPTIONS

You have a career ahead of you—a lifetime series of experiences and decisions related to your EDUCATION and WORK. Maybe without knowing it you are already making decisions that will affect your career future—like deciding to take one subject instead of another; to join one activity at school instead of another; to work next summer; etc., etc., etc. Even in 9th grade, it's not too early to begin planning your career future. Otherwise, by not planning, you may rule out some good career options (choices).

This report and your copy of *EXPLORING* will help you find and explore careers in line with the things you like to do. They won't tell you what to do. But they will help you **plan** your career future rather than just letting it happen to you.



Your VIP Report Label

SMITH, JOANNE 12/25/61

BASED ON THE ACTIVITIES YOU LIKE,
YOUR WORLD OF WORK MAP REGION IS 9.

FOR JOB FAMILIES IN THIS REGION,
SEE THE MAP ON PAGE 19 OF "EXPLORING."

About the World of Work

There are thousands of jobs in the world of work. One way to organize all of these jobs is to see how much they involve working with DATA, IDEAS, PEOPLE, and THINGS. Any job will involve some work with each. But most jobs will **mainly** involve only one or two of these four basic work tasks. Read over the descriptions of these work tasks in the box at the top of the next page.

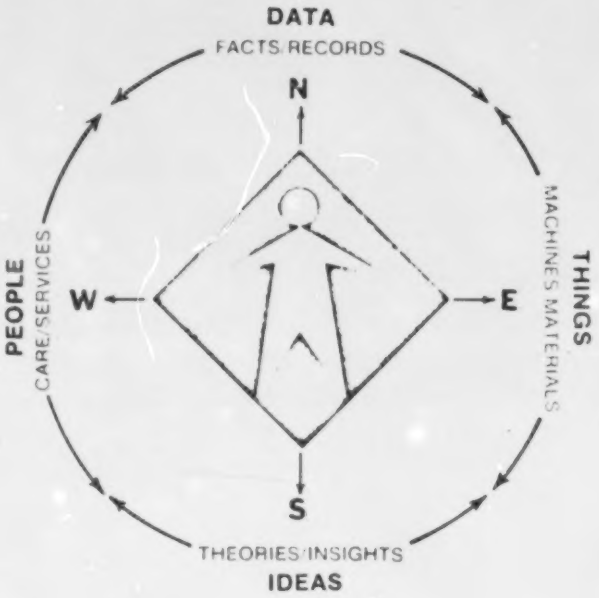
FOUR BASIC WORK TASKS: WORKING WITH—

DATA: facts, records, files, accounts, and steps for handling data and records—for example, in an office. Bank tellers and accountants work *mainly* with DATA.

IDEAS: theories, insights, new ways of saying something—for example, with words, equations, or music. Song writers and scientists work *mainly* with IDEAS.

PEOPLE: people you help, serve, care for, or sell things to. Salesworkers and school teachers work mainly with PEOPLE.

THINGS: machines, tools, living things, and materials such as food, wood, or metal. X-ray technicians and bus drivers work mainly with THINGS.



Note how each of the above corresponds to the poles of a map: North (DATA)—South (IDEAS)—West (PEOPLE)—East (THINGS). These basic work tasks help you get the big picture about the world of work. The World-of-Work Map will help you see where different kinds of jobs fit in.

The World-of-Work Map

The World-of-Work Map is found on page 19 of your booklet, *EXPLORING*. This map shows how 25 groups of related jobs (job families) differ with respect to the four basic work tasks described above (DATA, IDEAS, PEOPLE, & THINGS). These job families contain all of the jobs found in the world of work.

The location of each job family on the map is based on the tasks typical of jobs in that family. For example, look at Job Family V: *Education and Social Service*. It is located on the WEST side of the map which means that jobs in this job family *mainly* involve work with PEOPLE. However, they might also involve some work with DATA and IDEAS and maybe even THINGS, but not as much.

Quite different job families are located in other regions of the map. "DATA jobs" are located "up north" (see *Paying, Receiving, & Bookkeeping*). "THINGS jobs" are in the east, and so on. Keep in mind that a job family may have hundreds of jobs and that no two jobs are exactly alike. The map provides the big picture. You will have to look at the jobs themselves for the details.

Now that you have seen how the world of work can be organized, turn to the next page and begin exploring your career options.

(Check if
when completed)

Finding Careers to Explore

____ ***STEP 1.*** Your World-of-Work Map Region is printed on your VIP Report Label. This region is based on the activities you said you liked to do when you took the VIP. If the activities you liked did not clearly suggest a region, turn to page 9 of *EXPLORING* and complete steps A and B of the Job Family Exercise. Now find the World-of-Work region on page 19 of *EXPLORING* which contains the Job Family in which your first job choice fell. Write your region number here ____.

____ ***STEP 2.*** Now turn to the World-of-Work Map on page 19 of *EXPLORING*. Circle your region on the map. Then circle the region to each side of it. For example, if your World-of-Work region is 3, you would circle region 3 and then circle regions 2 and 4.

____ ***STEP 3.*** Now look over the job families in the regions you have circled. Pick out two or three job families from these regions that look interesting to you—job families that you might want to learn more about. Circle them right on the map. Write the letters of these job families and their titles in the space provided below.

REMEMBER: Nowadays, almost all jobs can be done by members of both sexes.

Job Family Letter	Job Family Title
_____	_____
_____	_____
_____	_____

____ ***STEP 4.*** Pick one of the job families you listed above as a starting point for exploration. (After you have learned about the jobs in this family you can choose another to explore.) To find jobs in that job family, check the Job Family Charts in *EXPLORING* (pages 27-34). Among all the jobs listed, *circle two or three* that you might like to do. (For example, if you wrote down Job Family A: *Promotion and Direct Contact Sales* as one of your job family selections in STEP 3, you would look at the jobs listed for that job family on page 28 of *EXPLORING.)*

____ ***STEP 5.*** Now, in the space provided below, write in the letter of the job family you decided to explore. Then, under "Jobs to Explore" write down the two or three jobs that you circled. (You can write down more jobs if you want to!)

_____
Job Family Letter

Jobs to Explore

1. _____
2. _____
3. _____
_____
_____

(Use another sheet of paper if you need to.)

____ ***STEP 6.*** How much do you know about the jobs you have listed? How can you find out what the jobs are really like? The back of this page has some ideas. Pick out one or two jobs from STEP 5. Learn more about them and see if they would be right for you. Turn to the next page and find out ways to explore your career future.

CAUTION! Interests (the things you like to do) are not the same as abilities. Only you can determine whether you have the ability to do certain jobs or not.

DON'T STOP when you've looked into these jobs and the others you have listed. This report is not meant to set a limit on the careers you explore—just to give you some ideas you may not have thought of otherwise. **You** will have to decide what direction your career will take. One way or another you have already begun!

WAYS TO FIND OUT ABOUT CAREERS

Career Exploration Guide for _____.

Some ways to explore job families and jobs you are interested in are listed below:

1. Talk with your counselor about them. Also speak with your counselor about your career plans and ideas.
2. Talk with your teachers about the jobs. Learn how these jobs relate to the subjects they teach. See the subjects listed in the Job Family Charts on pages 27-34 of *EXPLORING*.
3. Visit workers (by yourself or with friends) doing jobs that you are interested in. Ask your counselor, teachers or parents to help you set up a visit or tour.
4. Ask your counselor or teacher to invite workers to your school for a "career conference." These people can tell you and other interested students about their work and how they prepared for it.

Your school has many things for you to read, look at, or listen to—all will help you learn more about jobs and the world of work. See below.

Things to Read

1. There are many books available that will tell you about jobs, what people do in them, and how to learn more about them. Many of these books can be found in the public library. Some of the books that your school has are:

   _____

   _____

   _____

   _____

   NOTE: These can be found in your _____

2. Your school also has booklets, brochures, "career kits" and similar types of materials that give you information about many jobs. This information might include the activities done on the job, the training needed, and how to learn more about these jobs. Some of the "career kits" your school has are:

   _____

   _____

   _____

   _____

   NOTE: These "kits" are located in your _____.

REMEMBER: If you have questions about any of these materials, your counselor, teacher, or librarian can help you.

Things to Look at and Listen To

Filmstrips (some with records or cassettes) are available that show you different kinds of jobs and describe the work that is done in them. These filmstrips can give you some ideas on career exploration as well. Some of the filmstrips your school has are:

_____

_____

_____

_____

NOTE: These are found in your _____

How Your "EXPLORING" Booklet Can Help

Your *EXPLORING* booklet can serve as a guide to your career exploration and planning. For example:

1. Pages 4-7 describe some ways to make career plans and some ways *not* to make them.
2. The "Educational Road Map" on pages 14-15 will help you sort out the many types of education you can obtain after high school. Descriptions of 12 different types are provided on pages 25-26.
3. The Career Exploration Check List on pages 23-24 has additional ideas on how to explore careers. See also the sources of help listed on the back cover.

Appendix B

Career Guidance Survey

11/14/75

CAREER GUIDANCE SURVEY

This survey will be used to provide a summary of the career planning activities of 9th graders at your school. Your answers to the questions will be combined with those of other 9th graders to provide an overall picture of current activities and needs. Answer the questions in the spaces provided on this sheet. You may have answered questions like some of these earlier this year. If so, don't worry about having changed your mind. Just answer according to how things are now. It's easy!

Before starting, please print your name, birthdate, today's date, and the name of your school in the blanks below.

NAME _____
(please print) Last First Middle

DATE OF BIRTH _____ TODAY'S DATE _____
Month Day Year Month Day Year

SCHOOL _____

GO ON TO QUESTION 1 BELOW.

1. Think about the future jobs you are seriously considering. How many are there? You can count them out by making a mark on this sheet for each job. Then add up the marks and write the total number here. _____
Number of jobs you are considering

2. Next, please print the name of the job that you are thinking about most in the box below.

Please print!

"1st Job Choice" [ ]

3. Now, print the name of your second job choice below.

"2nd Job Choice" [ ]

Special note about items 2 and 3. While being a homemaker is often a full-time job, most homemakers work outside of the home at some time during their lives. So, those of you who wrote down homemaker should, instead, mark job choices outside of the home.

4. Think about your first two job choices. How sure are you that one of them will be your top choice in a year? Circle the letter for the answer that fits you best.

A. Very sure B. Fairly sure C. Not sure at all

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Below are listed several things that students do to find out about jobs--what they are like, how you prepare for them, etc. We would like to know whether you have done any of these things during the last three weeks.

Think only of your 1ST TWO JOB CHOICES as you answer each of the following items. Show how often you have done each of the activities by circling A, B, or C for each item.

A ... means "No, I haven't done this OR the time I spent on this is not worth mentioning"

B ... means "Yes, I have done this but only once or twice"

C ... means "Yes, I have done this several times."

A B C 5. Read a description of one of the jobs in the school library or guidance office job files.

A B C 6. Read a description of one of the jobs outside of school (public library, YWCA/YMCA, State Employment Service Office, newspaper, magazine, etc.).

A B C 7. Listened to tape recordings or saw slides, a TV program, or a movie about one of the jobs.

A B C 8. Discussed the jobs with a friend my age.

A B C 9. Talked with a counselor or teacher about how my goals, interests, and abilities relate to the jobs.

A B C 10. Discussed the jobs with a parent, relative, or guardian.

A B C 11. Talked with workers in the jobs about how they came to be in the job.

A B C 12. Identified the school courses that it would be helpful to take for each of the jobs.

A B C 13. Wrote for materials (outside of school) describing one of the jobs or related educational programs.

A B C 14. Visited a place of employment to see what one of the jobs was like.

A B C 15. Asked someone at school (counselor, teacher, etc.) to arrange for me to talk with persons in one of the jobs or to see them at work.

A B C 16. Took up a hobby, got a part-time job, or joined a group or club (outside of school) that is related to one of the jobs.

17. Have you done anything else to find out about careers during the last three weeks? If so, please list (print) below.

_____

_____

_____

Questions 18, 19, and 20 also concern your lst two job choices. For each question, circle the letter for the answer that fits you best.

18. Have you given much thought as to why these two jobs are "right" for you?

A. A little
B. Some
C. A lot

19. How sure are you of the steps to take in order to prepare for and enter each of the two jobs?

A. Don't know where to begin
B. Have some idea of how to go about it
C. The steps are pretty clear
D. The steps are quite clear

20. Is the amount of education you are planning in line with what is needed for the jobs?

A. Yes
B. Not sure
C. Probably not

21. During the past three weeks, have you spent more or less time than usual thinking about your career future?

A. Less time
B. About the same
C. More time
D. Much more time

Six Job Clusters are described below. These Job Clusters cover the entire world of work. Would you like to find out more about the jobs in any of the six Job Clusters? Check "Yes" or "No" for each Job Cluster.

Find out more?

___ Yes ___ No 22. Business Sales & Management
Examples of jobs: store, hotel, and company managers; sales workers in stores; sales workers who visit customers (for example, insurance agents and wholesalers); bankers, travel agents; etc.

___ Yes ___ No 23. Business Operations
Examples of jobs: bank tellers; accountants; secretaries and typists; cashiers; office machine and computer operators; stock and shipping clerks; cab drivers; mail carriers; etc.

___ Yes ___ No 24. Technologies & Trades
Examples of jobs: cooks; hairdressers; tailors; persons who repair or service TV sets, appliances, or typewriters; machinists; printing press operators; bus and truck drivers; carpenters and electricians; farmers and foresters; engineers and engineering technicians; computer programmers; pilots; etc.

___ Yes ___ No 25. Natural, Social, & Medical Sciences
Examples of jobs: biologists; chemists; doctors; lab, X-ray, and dental technicians; dietitions; psychologists; lawyers; sociologists; etc.

Find out more?

___ Yes ___ No 26. Creative & Applied Arts
Examples of jobs: authors; singers; musicians; news reporters; interpreters; interior decorators; architects; commercial artists; photographers; etc.

___ Yes ___ No 27. Social, Health, & Personal Services
Examples of jobs: teachers; social workers; librarians; nurses; child care aides; waiters and waitresses; housekeepers; police officers; firefighters; food inspectors; etc.

28. Do you recall receiving a report of your career interests which showed your region on the "World of Work Map"? (Note.--Some reports were given out in November; others have been delayed.)

A. Yes
B. No (skip to item 32)

29. What did you learn from the report?

A. I didn't pay any attention to the report
B. It suggested careers I had not thought about before.
C. It backed up the career choices I had already made.
D. It told me what career I should enter.
E. It didn't make any sense so it wasn't helpful.

30. Do you see more career possibilities for you now than before you received your report?

A. Yes
B. No

31. Do you believe that other students should be given the chance to take the Vocational Interest Profile (VIP) and get a "World of Work Map" report?

A. Yes
B. No

32. This is the end of the survey. Thank you for your help!

Letter to Low Interest Group

ACT

Educational Programs and Services

January 5, 1976

Dear Senior,

Last October you were among the 110,000 young women who took the ACT Assessment. You should have received your ACT Student Profile Report several weeks ago. As we looked over the Assessment results, your name came to our attention because you appear to have high potential in natural science, engineering, and technology. Your ACT Natural Sciences score ranks in the top fifth of scores for students going to college and your Mathematics score ranks in the top half. You reported A or B grades in your high school science and math courses. However, your ACT report also shows you are not considering a career in these areas.

Perhaps you have already decided on a career in another area. If so, we wish you success in your chosen field. But since you told us when you took the ACT Assessment that you want information about educational programs that seem to match your characteristics, we would like to call your attention to the increasing number of career opportunities for women in natural science and technology. If you haven't considered a career in one of these areas because you aren't aware of the opportunities, the enclosed materials will give you some of the information you need:

- Women in Science and Technology: Careers for Today and Tomorrow, a booklet to help you think about careers in fields many people once considered to be "for men only."
- A list of some of the majors or groups of courses in science and technology offered by each of the college choices you indicated when you took the ACT.
- A postcard to return to me if you want more specific career information.

Capable young women like you are building important and rewarding careers in all areas and at all levels of science and technology. We hope the enclosed materials will be helpful as you explore your career options.

Sincerely,

Gail T. McLure

Gail T. McLure
Research Psychologist

Developmental Research Department
Research and Development Division

GTMcL emo

Enclosures

Appendix E

Career Guidance Survey, Form B

CAREER GUIDANCE SURVEY *(FORM B)*

SECTION I

1. How many future jobs are you seriously considering? _____

2. **Print** the name of the job that you are thinking about **most.** _____
   1st JOB CHOICE

3. Print the name of your second job choice. _____
   2nd JOB CHOICE

   Special note: Although being a homemaker is often a full-time job, most homemakers work outside of the home at some time during their lives. If you wrote homemaker, go back to items 2 and 3 and write the name of jobs outside the home.

4. Think about your first two job choices. How sure are you that **one** of them will be your top choice in a year? Circle the letter of the answer that fits you best.

   A. Very sure **B.** Fairly sure **C.** Not sure at all

The six Job Clusters described below cover the entire world of work. Would you like to **find out more** about the jobs in any of the six Job Clusters? Check "Yes" or "No" for each Job Cluster.

Want to find out more?

___ Yes ___ No 5. **Business Sales and Management**
Examples of jobs: Promotion and direct contact sales; management planning; retail sales and services

___ Yes ___ No 6. **Business Operations**
Examples of jobs: Office management and secretarial work; paying, receiving and accounting; data processing and office machine operation; storage, dispatching, and delivery

___ Yes ___ No 7. **Technologies and Trades**
Examples of jobs: Human services crafts; machine operating, servicing, and repairing; agriculture and related areas; engineering and other applied technologies

___ Yes ___ No 8. **Natural Sciences, Social Sciences, and Medical Sciences**
Examples of jobs: Natural sciences and mathematics; medicine and medical technologies; social sciences and legal services

___ Yes ___ No 9. **Creative and Applied Arts**
Examples of jobs: Creative arts; applied arts (verbal); applied arts (visual); popular entertainment

___ Yes ___ No 10. **Social, Health, and Personal Services**
Examples of jobs: Education and social services; nursing and human care; personal and household services; law enforcement and protective services

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25. How sure are you of the steps to take in order to prepare for and enter each of the two jobs?

A. Don't know where to begin
B. Have some idea of how to go about it
C. The steps are fairly clear
D. The steps are quite clear

26. Is the amount of education you are planning appropriate preparation for the jobs?

A. Yes
B. Not sure
C. Probably not

27. During the past two or three months, have you spent **more** or **less** time than usual thinking about your career future?

A. Less time
B. About the same
C. More time
D. Much more time

28. In the space below, please print the name of the college program of study you are now considering.

_____

_____

To answer question 29, use the list of college programs of study on page 6. Find the program of study you plan to enter and write its number on the line below. If you cannot find an exact description of the program you plan to enter, choose a general area—for example, **100** *(Agricultural Fields),* **200** *(Engineering Fields),* **220** *(Fine and Applied Arts).* If you are completely undecided, write 000.

_____ 29. Write the number corresponding to your program of study.

___ ___ 30. Do you plan to take any science courses during your first year in college?
Yes No

___ ___ 31. Do you plan to take mathematics courses during your first year in college?
Yes No

SECTION II

Below are two lists of statements related to high school girls and their interest in careers in science and technology.* Read each statement. Then circle the appropriate number to indicate the importance of each statement in explaining how high school girls feel about careers in science and technology. For example, "**1**" means the statement is "of little importance" in explaining how high school girls feel about careers; "**3**" means the statement is "important," and "**5**" means the statement is "very important."

**Science and technology includes science, mathematics, engineering, and technical fields.*

II-A

How important are the following situations or attitudes in accounting for the fact that **fewer** girls than boys seriously consider science and technology careers?

	Circle a Number				
	Of Little Importance		Important		Very Important
1. Men are usually pictured in science textbooks.	1	2	3	4	5
2. Most science teachers are male.	1	2	3	4	5
3. Few female scientists are mentioned in class.	1	2	3	4	5
4. Girls don't get enough information about science and technology careers.	1	2	3	4	5
5. Preparation for a career in science seems to be very hard, long, and expensive.	1	2	3	4	5

	Of Little Importance		Important		Very Important
6. Girls aren't aware of women scientists who might encourage them to think about science careers.	1	2	3	4	5
7. Counselors and teachers don't encourage girls to consider science/technology careers.	1	2	3	4	5
8. People think science isn't an appropriate career for girls.	1	2	3	4	5
9. Girls think women scientists are unfeminine.	1	2	3	4	5
10. Some girls are unwilling to be one of the first women in an "all male field."	1	2	3	4	5
11. Girls expect discrimination in college admission, education, and employment.	1	2	3	4	5
12. Girls worry about combining family responsibilities with the demands of a career.	1	2	3	4	5
13. People think that girls are less capable and hard working than boys.	1	2	3	4	5
14. Girls do not consider themselves bright and talented enough to succeed.	1	2	3	4	5

15. Can you add any other important reasons to the list above? _____

_____

16. Write the number of the item that is **most important** in explaining why **fewer** girls than boys seriously consider science and technology careers. ☐

17. Write the numbers of the two (2) items that are next most important. ☐ ☐

18. Have any of the above specifically influenced **your** interest in science and technology careers? Write their numbers here.

_____

(If none applies to you, write "none.")

II-B

How important are the following factors in explaining why some girls do seriously consider science and technology careers?

Circle a Number

	Of Little Importance		Important		Very Important
1. Extra encouragement and help from teachers.	1	2	3	4	5
2. A special challenge to succeed in science because some people believe girls can't.	1	2	3	4	5
3. Changing attitudes about what is appropriate work for women.	1	2	3	4	5
4. Encouragement from family to fulfill individual potential.	1	2	3	4	5
5. The likelihood that a science career is a good way to achieve status and wealth.	1	2	3	4	5
6. Importance of science in solving some of the world's problems.	1	2	3	4	5

7. Can you add any other important reasons to the preceding list? _____

_____

8. Write the number of the item that is most important in explaining why some girls do seriously consider science and technology careers. ☐

9. Write the numbers of the two (2) items that are next most important. ☐ ☐

SECTION III

Below are some different kinds of specific information that might be useful to girls as they consider science and technology careers. For each, circle the appropriate number to indicate how useful you think the information would be.

	Circle a Number				
	Of Little Importance		Important		Very Important
1. Information on where booklets, "briefs," etc. describing science/technology careers are available locally.	1	2	3	4	5
2. General descriptions of science careers.	1	2	3	4	5
3. More specific information about:					
a. what it's like to be a woman in science.	1	2	3	4	5
b. what it's like "on the job" in a science career.	1	2	3	4	5
c. what makes science careers exciting and interesting.	1	2	3	4	5
4. Preparation needed for a science career:					
a. what high school courses and college majors are required.	1	2	3	4	5
b. length of training required for different types of science careers.	1	2	3	4	5
c. how difficult preparation might be.	1	2	3	4	5
5. Financial considerations:					
a. how expensive training might be.	1	2	3	4	5
b. how your educational expenses might be financed.	1	2	3	4	5
c. probable income in a science career.	1	2	3	4	5
6. Opportunities in science careers:					
a. job opportunities for women in the future.	1	2	3	4	5
b. equal opportunity laws designed to help women considering science careers.	1	2	3	4	5
c. ways women can combine family life and a successful career.	1	2	3	4	5

COLLEGE PROGRAM OF STUDY – MAJORS

100 AGRICULTURE, general
101 Agricultural Business
102 Agricultural Economics
103 Agricultural and Farm Management (farming and ranching)
104 Agriculture, Forestry, and Wildlife Technologies
105 Agronomy (field crops and crop management)
106 Animal Science (husbandry)
107 Fish, Game, and Wildlife Management
108 Food Science and Technology
109 Forestry
110 Horticulture, Ornamental Horticulture
111 Natural Resources Management (soil conservation)

120 ARCHITECTURE, general
121 Architecture Technology
122 City, Community, and Regional Planning
123 Environmental Design, general
124 Interior Design

130 BIOLOGICAL SCIENCES, general
131 Biology
132 Biochemistry
133 Botany
134 Ecology
135 Microbiology
136 Zoology

140 BUSINESS AND COMMERCE, general
141 Accounting
142 Banking and Finance
143 Business Economics
144 Business Management and Administration
145 Food Marketing
146 Hotel and Restaurant Management
147 Labor and Industrial Relations
148 Office Management
149 Marketing and Purchasing (sales and retailing)
150 Real Estate and Insurance
151 Recreation and Tourism
152 Secretarial Studies
153 Transportation and Public Utilities

160 COMMUNICATIONS, general
161 Journalism
162 Radio-Television (related to broadcasting)
163 Advertising

170 COMPUTER AND INFORMATION SCIENCES, general
171 Computer Programming
172 Information Systems and Sciences
173 Systems Analysis
174 Data Processing Technology
175 Computer Operating
176 Data Systems Repair

180 EDUCATION, general
181 Agricultural Education
182 Art Education
183 Business, Commerce, and Distributive Education
184 Elementary Education
185 English Education
186 Home Economics Education
187 Industrial Arts, Vocational-Technical Education
188 Mathematics Education
189 Music Education
190 Physical Education
191 Science Education
192 Secondary Education, general
193 Social Science Education
194 Special Education
195 Speech Education

200 ENGINEERING, general
201 Aerospace, Aeronautical, and Astronautical
202 Agricultural Engineering
203 Architectural Engineering
204 Chemical Engineering
205 Civil Engineering
206 Electrical, Electronics, and Communications Engineering
207 Environmental and Ecological Engineering
208 Geological Engineering
209 Industrial and/or Management Engineering
210 Mechanical Engineering
211 Metallurgical and Materials Engineering
212 Mining and Mineral Engineering
213 Nuclear Engineering
214 Ocean Engineering
215 Petroleum Engineering

220 FINE AND APPLIED ARTS, general
221 Applied Design (ceramics, weaving, commercial art)
222 Art (painting, drawing, sculpture)
223 Art History and Appreciation
224 Dance
225 Dramatic Arts (theater arts)
226 Music (liberal arts)
227 Music (performing, composition, theory)
228 Music History and Appreciation
229 Photography, Cinematography

230 FOREIGN LANGUAGES, general
231 French
232 German
233 Italian
234 Latin
235 Spanish
236 Russian

240 HEALTH PROFESSIONS, general
241 Dentistry
242 Dental Assistant
243 Dental Hygiene
244 Dental Lab Technology
245 Environmental Health Technologies
246 Medicine
247 Medical Assistant or Medical Office Assistant
248 Medical or Laboratory Technology
249 Nursing (registered)
250 Nursing (licensed practical nurse)
251 Occupational Therapy
252 Optometry
253 Pharmacy
254 Physical Therapy
255 Public Health
256 Radiology
257 X-ray Technology
258 Surgical Technology (surgeon's assistant, etc.)
259 Veterinary Medicine

260 HOME ECONOMICS, general
261 Clothing and Textiles
262 Consumer Economics and Home Management
263 Family Relations and Child Development
264 Foods and Nutrition (including dietetics)
265 Institutional Management

270 LETTERS (Humanities), general
271 Classics
272 Comparative Literature
273 Creative Writing
274 English, general
275 Linguistics
276 Literature, English
277 Philosophy
278 Religion
279 Speech, Debate, Forensic Science

280 MATHEMATICS, general
281 Applied Mathematics
282 Statistics (mathematical and theoretical)

285 PHYSICAL SCIENCE, general
286 Astronomy
287 Chemistry
288 Earth Sciences
289 Geology
290 Oceanography
291 Physics

300 COMMUNITY SERVICE, general
301 Law Enforcement and Correction (police science)
302 Parks and Recreation Management
303 Public Administration
304 Social Work
305 Military

310 SOCIAL SCIENCES, general
311 Anthropology
312 Area Studies (American Civilization, American Studies, etc.)
313 Economics
314 Ethnic Studies (Asian Studies, Black Studies, Chicano Studies, etc.)
315 Geography
316 History
317 International Relations
318 Law (prelaw)
319 Political Science
320 Psychology
321 Sociology

330 TRADE, INDUSTRIAL, AND TECHNICAL, general
331 Agricultural Mechanic and Technology
332 Air-Conditioning, Refrigeration, and Heating Technology
333 Aeronautical and Aviation Technology
334 Appliance Repair
335 Automobile Body Repair
336 Automobile Mechanics
337 Business Machine Maintenance
338 Carpentry and Construction
339 Drafting, Engineering Graphics
340 Electricity and Electronics
341 Engineering Technology, Aeronautical
342 Engineering Technology, Automotive
343 Engineering Technology, Civil
344 Engineering Technology, Industrial Manufacturing
345 Engineering Technology, Mechanical
346 Graphic Arts (printing, typesetting)
347 Heavy-Equipment Operating
348 Dry Cleaning, Laundry, and Clothing Technology
349 Industrial Arts
350 Leatherworking (shoe repair, etc.)
351 Machinework (tool and die, etc.)
352 Masonry (brick, cement, stone, etc.)
353 Metalworking
354 Plumbing and Pipefitting
355 Radio-TV Repair
356 Small-Engine Repair
357 Upholstering
358 Watch Repair and other Instrument Maintenance and Repair
359 Welding
360 Woodworking (cabinetmaking, millwork)

370 GENERAL STUDIES

000 Undecided

Appendix F

High School Guidance Inventory

March, 1976

Appendix F

HIGH SCHOOL GUIDANCE INVENTORY

Before starting, please print your name, birthdate, and your school name below.

NAME _____
(please print) Last First Middle

DATE OF BIRTH _____ School _____
Month Day Year

Paula Peters, a 9th grade student who is seriously thinking about a career in science has the ability to do well in science and other career areas. But there are also many other things that might encourage her to plan a career in science.

Directions for items 1-8: Below are factors that might encourage Paula or girls like her to plan a career in science. Read them over and then complete item 9 below.

1. Her family encourages her to plan this career.

2. She gets extra encouragement in school because she is one of the only girls planning on this career.

3. She wants to prove that girls can succeed in this science career.

4. She gets high grades in Science and Math courses.

5. She is aware that attitudes are changing about the types of careers that women can get into.

These special characteristics of science careers:

6. A good way to achieve status and wealth.

7. Importance in solving some of the world's problems.

8. A challenging way to use abilities.

9. List any other factors that you can think of that might encourage Paula to plan a science career. _____

_____

_____

_____

_____

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Directions for items 10-19: Below are factors that might cause Paula to change her mind about planning a science career. They might cause her to plan a "non-science" career instead. Place a check mark (✓) on the line to the left of the ones that are MOST likely to occur.

_____ 10. She does not have much information about science careers.

_____ 11. She does not know what courses are needed to prepare for a science career.

_____ 12. She does not know any women in this career who could tell her more about it.

_____ 13. She is discouraged by her friends from entering school science courses.

_____ 14. She is discouraged by her friends from joining school science clubs and activities.

_____ 15. Her counselors and teachers discourage her from planning a science career.

_____ 16. Her parents discourage her from planning a science career.

_____ 17. She thinks that women in this career are unattractive and masculine.

_____ 18. People think that because she is a girl, she is not capable of succeeding in this career.

_____ 19. She does not think a woman can have both a family and a science career.

20. List any other factors you can think of that might cause Paula to change her mind about a science career. _____

_____

_____

Directions for items 21-29: Paula would like to learn more about the science career is considering. Different types of information are listed below. Place a check mark (✓) on the line to the left of those types of information that you think would be MOST useful to Paula or girls like her.

INFORMATION ON:

_____ 21. What other girls who are preparing for this career say about it.

_____ 22. What it's like to be a woman in science.

_____ 23. What it's like "on-the-job" in this science career.

_____ 24. What high school and college courses are needed for this career.

_____ 25. How long the training for this career might be.

_____ 26. How expensive the training might be.

_____ 27. The salary of a person in this sci career.

_____ 28. Future opportunities for women in this career.

_____ 29. How a woman can combine a family life with this career.

_____ 30. List any other kinds of information that Paula might want about the science career she is considering. _____

_____

_____

_____

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